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More Subway Troubles.

Monday, June 16, brought forth another slight eruption of the volcano at Fulton and Broadway. It was sufficient to damage an Edison electric light cable. This time it was the New York Steam Heating Company's pipes which broke and let steam and sand float around in a very promiscuous way.

On Wednesday, the 18th, another blow-up took place. This was again occasioned by the steam pipes, and the damage was considerably greater than on Monday. No electrical interests were injured by this explosion. Buildings in the vicinity were filled with steam and flying dirt and sand. Knox, the hatter, has sued the steam company for $50,000 damages to his stock and building. Commissioner Gilroy's experts have rendered their report of the conflagration on the 12th of June. They fasten the blame for breaking the gas mains upon the New York Steam Heating Company. Engineer Kearney's report agrees with the other in the matter of making the steam company responsible for the destruction of property. It is rumored that the city authorities will condemn the whole steam heating plant.

With such an underground network of gas mains, water mains and steam pipes, the majority of them in bad condition, is it not a remarkable fact that the electrical subways give the service they do? Subways alone are all right; combined with leaky gas, steam and water pipes, they are all wrong.

Just as True.

That rare combination of moralist, philosopher and electrician, only to be found in the technical journalist, has enunciated, amongst other things, the fact that with regard to personal danger the lineman is in infinitely greater peril from gravity than electricity.—*Electric Plant, London.*

The above sneer is from an advertising sheet of London. The remark quoted was made by one of the most practical, able and respected men identified with electrical work, one who is not a "technical journalist." Mr. C. J. H. Woodbury, vice-president of the Manufacturers' Mutual Insurance Company, of Boston, is the author of the statement, which appeared in a paper read by him before the National Electric Light Association, in 1886, and it is just as true to-day as it was then, notwithstanding the howl about burying the wires. Some new dangers, such as explosions of gas and steam pipes, have arisen in this city, but that was to be expected of a city so ignorantly governed as is New York.

Wills' Controlling Switch.

This switch is of that class in which the circuit controlling arm or element is moved by hand against the power of a spring until the arm has been carried past its center, when the power which has been stored in the spring is exerted automatically to complete the movement and change the circuits. It is designed more especially for heavy currents and its object is to provide a construction whereby good contacts are assured each time the switch is operated. The action of the switch can be seen from the cuts. The points of particular merit are the construction whereby two springs are utilized to each circuit controlling arm, one located on each side, thereby rendering the movement of the arm easy, by preventing binding at the pivot. Another feature of this switch is that the current does not flow through the pivot, but has a free course around the same through the springs. Again, the movement of the current controlling arms is so extensive, bearing nearly 90° while under the influence of the springs, that the wedge shaped cross head is forced deep between the contacts and ensures a good electrical connection.

This switch is adaptable to a great variety of connections. It may be used as a simple make and break switch, as a means of cutting of one branch and cutting in another, or as a pole changing switch. These changes may be made by altering the connections of the circuits with the contact pieces.

Some of these switches are now in use on the lines of the United Electric Railway, Richmond, Va., and are giving entire satisfaction.

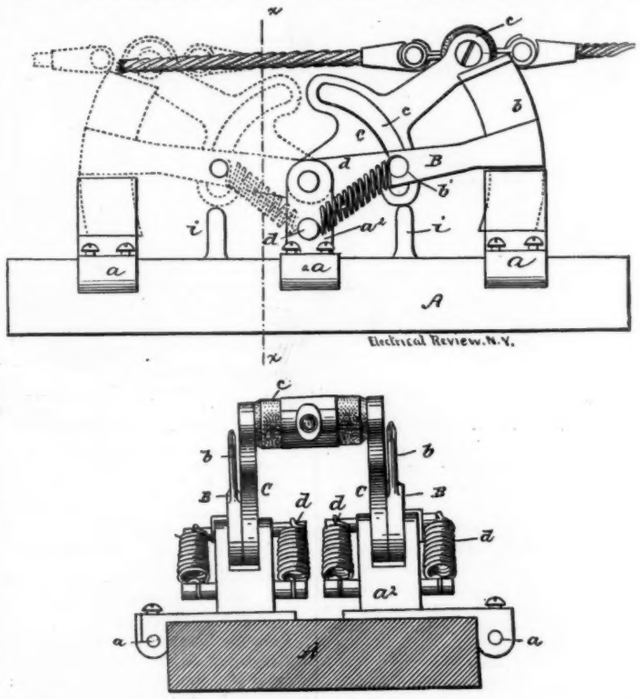

DIAGRAM OF A NEW CONTROLLING SWITCH.

Getting Around a Monopoly.

The Western Union has exclusive control of the wires leading from the Terre Haute (Indiana) Interstate Ball Park, and this barred the Terre Haute *News* from getting bulletins of games in progress. To counteract this difficulty, the *News* erected a pole on the outside of the fence, placed a platform 35 feet above the ground, where an operator sits and records the games by innings, and in this way the enterprising paper supplies its patrons.

Two young electrical workers of Topeka, Kan., Orr Adams and Fred. Goolman, who designed and constructed a miniature electric railway, on exhibition in the window of Larimer's drug store, have fitted up a shop and will manufacture them for sale. A Topeka commercial drummer will have charge of the sales while on his regular trip. Each car will bear the name "Topeka."

Lightning Strikes a Telephonist's Residence.

About 8 o'clock one evening last week, the residence of Mr. Ajax S. Hibbard, at Morristown, N. J., was considerably shaken up by a bolt of lightning. Mr. Hibbard is the general superintendent of the American Telephone and Telegraph Company, and although an electrician of recognized ability, he was a little skeptical about various fairy tales of lightning's freaks. After this, Mr. Hibbard will be a firm believer in the eccentricities of the frisky god of thunder.

There are eight electric wires entering Mr. Hibbard's house from a tall tree near by, on which is placed a Westinghouse transformer. The lightning, disdaining both the tree and wires as avenues of easy passage, struck a chimney on the corner of the house. After ripping off a "sufficient quantity" of bricks, as the cook books would put it, the bolt divided, a large slice of it diving beneath the roof. Here it exploded, tore a large hole in the roof and made boarding house hash of the shingles. Another part of the bolt dropped through the air and exploded opposite a window where Mr. Hibbard was sitting. Still another piece got into the kitchen in some way and tried to be friendly with the servants. After chasing the cook and housemaid twice around the room, it jumped into the range, where it stayed. The cook developed into quite a hurdle racer during this entertaining side show. Between jumping over tables and chairs and crossing herself, she had a lively time of it. Throughout the race the housemaid was a close second, with lightning at her back riding for a grand stand finish.

The next time a three-ring lightning circus visits Mr. Hibbard, we hope he and his family will escape as luckily as they did on this occasion.

A FEW REMARKS FROM THE PRESS.

Evidently the Bawl System.

The electric light system at St. Charles is in disfavor, because it keeps the town cows awake at night.—*St. Joseph News.*

A Natural Query.

How Laredo ever got along without electric lights, is a puzzling question, now that the city has gotten used to them.—*Laredo Times.*

Puns from the Electrical Field.

"Well, I'm ohm," said the electrician, when he had let himself in after midnight.

"But why are you insulate?" asked his wife.—*N. Y. Sun.*

Dog-Killing Dynamos.

Peoria will have her stray dogs killed by electricity. His honor, the mayor, is too tender hearted to order them poisoned. Each policeman will carry a dynamo and will be able to exterminate about 75 canines per hour.—*Quincy, Ill., Journal.*

Another Million.

Henry Villard, as a representative of the Sprague-Edison Electrical Equipment Company, has taken an interest in the Milwaukee City Railroad, and $1,000,000 will be invested in equipping it as an electric road with the Sprague system.—*Boston Transcript.*

Steam in the Air.

There was a row in New York some time ago about burying wires, and a great many are underground. Now it seems the steam pipes must come out of the ground. Could they not be covered with asbestos and strung on poles? Why not attach them to the pillars of the elevated railroads.—*Brooklyn Standard-Union.*

Copper Still Ascending.

The sale of the entire balance of the "syndicate" holdings of copper is confirmed in Boston. This clears the field of all the metal of this nature. One of the largest consumers of copper in this country is buying "futures" at 16½ cents. Mining men are now predicting 18 cents for Lake copper, and a wager has been made that it will sell at 20 cents by January, 1891.—*Boston Globe.*

A Voluminous Record.

A record of large proportions is being prepared in the office of the clerk of the United States Circuit Court. It is the case of Westinghouse *vs.* Edison, in which an appeal was taken from the Circuit Court to the Supreme Court of the United States. The record, when complete, will contain over 5,000 pages of printed matter, and will be one of the largest records ever filed in any court.—*Pittsburgh Tribune.*

Uniform or Insulation.

The proceedings of the committee on the Central London Railway Bill were enlivened the other day by an unlooked-for comicality from Sir Benjamin Baker, says the London *Electrical Engineer.* "Now, Sir Benjamin," said an opposer to the bill, "what about the conductors for your currents; are we to presume that they will both be covered?" To this the hero of the North Bridge, with a tinge of sorrow for such simplicity in matters electrical in his voice, replied, "My dear sir, did you *ever* see two naked conductors running alongside a tramcar?"

The Thames Electric Launch Fleet.

The small fleet of electric launches which figured so prominently on the Thames last season will, this year, receive several additions. Hitherto the number of this new type of river boat on the Thames has been about 14; this year there are to be 22 or 23. Of the existing fleet, far away the finest is the "Viscountess Bury," owned by Messrs. Immisch. Since she was brought into prominence, some important improvements have been made in this vessel. The first alteration was the addition of a certain amount of "dead-wood" under the stern to assist the steering properties of the launch. She also possesses now a greater length of saloon, and, by sundry other internal rearrangements, her saloon accommodation has been materially enlarged and improved. Over all she measures 70 feet by 10 feet, and 60 or 70 people can be comfortably carried. She is now worked by a single motor and one 19-inch propeller. When prepared for a trip she is fitted with 164 storage cells. The motor takes, on the average, 45 amperes and 164 volts. She is steered from the bow end of the upper deck, and, as a rule, runs at about seven miles an hour. The saloon is, of course, amply furnished with glow lamps, and electric side lights are provided. The "Ray Mead" is almost twin with the "Viscountess Bury," but is somewhat wider and shorter. The remainder of the present fleet—all owned by and electrically fitted by Messrs. Immisch (or by the syndicate of which they are the visible embodiment)—are much smaller than these two. They average in length from 30 feet to 40 feet, are worked by single motors with 17½-inch propellers, and are provided with from 30 to 40 storage cells, giving an average current of 27 amperes. They are furnished with such electric lamps as may be necessary, but they are all open boats. Their traveling capacity is, however, pretty much the same as that of the larger launches, and they are much in favor for daylight trips.

The new electric launches that are at present building for the Thames number something like eight. They are almost entirely for private owners, and will in all essential features resemble the smaller boats last described. They will probably be more luxuriously fitted, though they will not otherwise show an advance on the existing launches, but, as the electrical plant will come from the same source, they will be equal in that respect. In addition to these new craft there is a small flat-bottomed electric launch being built at Hammersmith for Baron de Rothschild for use on the Dutch canals and on private waters.

Any one who has traveled on or watched an electric launch gliding through the water, can well appreciate the smoothness and quietness of its motion as compared with that of the puffing and rattling of the majority of steam launches, and of the malodorous naphtha launch. With respect to charging stations on the river, there is little new to be said. It was expected that some additional shore engines would be erected, but the only one at present finished is that on Platt's Eyot; three others will be shortly equipped. Of the two largest floating stations, one is already at Maidenhead, the other (the "Watt") is now at the Eyot, but later on she will move up to Henley. The rest are, or will be, moored at Reading, Windsor, Staines and other suitable spots. Kingston is, perhaps, too near to Hampton for the purpose, but it is suggested that a charging station might very well be moored at that busy and important boating place as a starting point. Seeing how well electricity has answered for launches, the question is raised, why not adapt it to house-boats, which are growing in number and in size every season? An electrical plant would be an immense advantage to these floating dwellings, and there would be much saving of steam and horse traction. It only remains for some ingenious mind to make the first experiment and show the way.—*London Electrician.*

* * Another street railway "deal" is reported in the sale of the Merrimac Valley Horse Railroad, of Lawrence, Mass., to a syndicate of outside capitalists. The purchasers are said to represent the Boston Construction Company. The capital stock of the road is $80,000, and 720 of the 800 shares have been closed out. The price paid is said to be $150 per share. The new owners will take possession at once and will probably equip the road with electric power. It is said that the syndicate controls roads in Newburyport and Haverhill, and that they contemplate building an electric line along the Merrimac Valley as far as the sea.

On a Runaway Electric Car.

The North avenue electric car that left the terminus of the road, at the corner of Tenth street and North avenue, at 8 o'clock last evening, was crowded with passengers, who were packed inside and on the platforms, like sardines. The conductor on the rear platform yelled "All aboard!" and released the brake. The machine moved off, gaining speed every second. It was dusk, and persons on the road could not be recognized from the car.

When the machine got a start of a couple of hundred feet, a man was seen running after it, waving his arms frantically and yelling vociferously. The conductor waited awhile to see if the man wanted a ride very much, before he touched the bell cord. The man acted as though his life depended on catching the car, and the conductor pulled the rope. On sped the car at an increased rate of speed. A second passed, two, three, four, and still the car did not slack. The conductor pulled the rope again viciously, thinking the engineer did not hear the first ring. A third time the bell was rung, and still the machine was increasing in speed and was descending a long and steep grade. The conductor leaned over the side of the platform, and yelled at the engineer, but received no response. The posts along the route flew by rapidly, and the car was moving at the rate of 30 miles an hour. The conductor tumbled over the persons standing in the car as he rushed through to the front platform. No engineer was there. The brakes were found to be unmanageable, and the car could not be stopped until it ran some distance up the next hill.

The car stood there five minutes, when the engineer, George Glenn, reached it, out of breath. He was the man seen waving at the car at the terminus, and the car rushed masterless at a terrific rate of speed down a steep grade for more than half a mile.—*Baltimore American.*

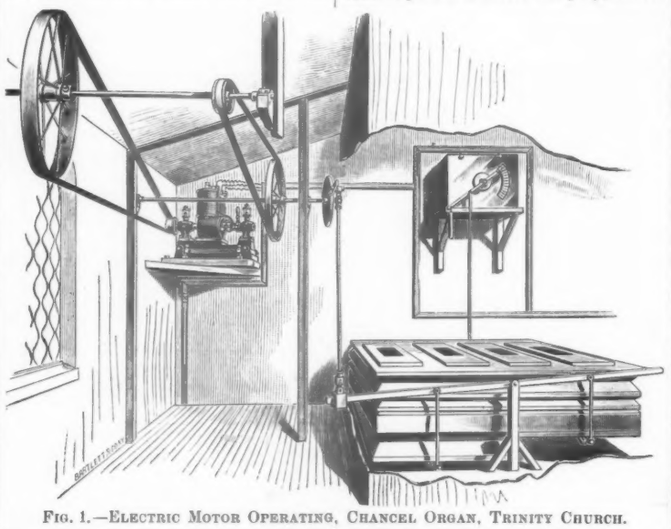

FIG. 1.—ELECTRIC MOTOR OPERATING CHANCEL ORGAN, TRINITY CHURCH.

Regulation of Electric Wires in Massachusetts.

The commonwealth of Massachusetts has passed the following act, which we publish in full, as it will be of interest to all electric companies:

Section 1. Every person or corporation, private or municipal, owning or operating a line of wires over streets or buildings in a city, shall use only wires that are suitable and strong; shall suitably and safely attach them to strong and sufficient supports, and insulate them at all points of attachment; shall remove all wires abandoned for use; shall suitably insulate every wire where it enters a building, and, if such wire is other than a wire designed to carry an electric light or power current, shall attach to it at suitable and convenient points in the circuit, calculating to prevent danger from fire and near the place of entering the building, an appliance calculated to prevent at all times a current of electricity of such intensity or volume as to be capable of injuring electrical instruments or causing fire from entering the building by means of such wire, beyond the point at which such appliance is attached, and shall suitably insulate every wire within a building when such wire is designed to carry an electric light current.

Sec. 2. Every such person and corporation shall, in the several cities, within six months after the appointment of the officer hereinafter provided for, affix at the points of support at which any such wire, or cable containing wires, is attached, a tag or mark, distinctly designating the owner or user of such wire or cable. No such tag or mark shall be required for the wires of a street railway company used for the transmission of its motive power, nor for the protection or support of such wires.

Sec. 3. Every city shall, by ordinance, designate or provide for the appointment of an officer who shall supervise every wire over streets or buildings in such city, and every wire within a building when such wire is designed to carry an electric light or power current; shall notify the person or corporation owning or operating any such wire whenever its attachments, insulation, supports or appliances are unsuitable or unsafe, or the tags or marks thereof are insufficient or illegible, and shall, at the expense of the city, remove every wire abandoned for use, and every wire which after the six months aforesaid shall be unprovided with a tag or mark, as hereinbefore required, such expense to be repaid by the owner of such wire, and shall see that all laws, ordinances and regulations relating to such wires are strictly enforced.

Sec. 4. Any city may recover, in an action of contract, of the person or corporation owning any such wire as is hereinbefore described, any expense which it may have incurred for any removal thereof.

Sec. 5. Any court having equity jurisdiction, or any justice thereof, in term time or vacation, may, on a petition of the officer designated or appointed as aforesaid, by any suitable process or decree in equity, enforce the provisions of this act, and may, on such petition, issue an injunction, or other suitable process, to restrain the use or maintenance, or to cause the removal of any wire, post or other support erected, maintained or used, in violation of this act.

Sec. 6. This act shall take effect upon its passage.

Approved, June 11, 1890.

Figures.

From the June issue of "Whipple's Electric Reports," we have culled the following number of central electric light stations: In the United States, 1,512; Canada, 101; Cuba, 1; Mexico, 9; total, 1,623.

Number of gas companies in the United States, 970; Canada, 49; Mexico, 1; total, 1,020. Of these, 298 operate electric light plants in addition to the gas plants, 276 being in this country, 21 in Canada and 1 in Mexico.

Electric railways in operation and under contract in the United States, 226; Canada, 4; total, 230. As the total number of street railways in this country and Canada is 903, it will be seen that just about one-fourth of them are operated by electricity.

The Natural Result of Giving Up the Electric Light.

Says the Fargo, North Dakota, *Republican:*

"And now Yankton is soon to give up the electric plant—it being too expensive. This is certainly a bad advertisement for the oldest city in the two Dakotas. The population of the city is now less than it was in 1875. As a city that is going backward it is rapidly getting to the front."

Electrical Matters in the Northwest.

A LETTER FROM TACOMA.

This Great New Northwest is the land for electricians, and though in Washington, west of the Cascade range, we do not have thunder storms, still we have electricity in all other forms. The people in all this region, which is now being settled so rapidly, believe that every town is going to grow into a city, and can support a metropolitan style. So the first thing to be done after clearing away the stumps is to establish an electric light plant, then an electric railway. After this comes an electric fire alarm system, a telephone exchange and an electric power company. Undoubtedly places go into electric lighting and railways much sooner than in the East in the hope that the articles in question will soon be necessary; and anyhow, they give the town a boom. Besides this, everything is obtained new at the start. We have no old gas plants, no old horse railways to which we may cling till we are sure that the best device has been discovered in lighting or in locomotion. So we feel that as electricity is the force of the future it must become the factor in these cities of the future.

As an illustration of this point, a few days ago I left St. Paul, and in the train there were five Thomson-Houston electricians. They were going to see about lighting, railway or power plants in Great Falls, Helena and Butte, Montana, and in Spokane Falls and Yakima, Washington.

Every day or two articles of incorporation are filed with the Washington secretary of state, at Olympia, for local light, power or railway companies. In many cases, the companies immediately begin work on their plants, and in others, the articles are simply in order to obtain a franchise which it is believed will soon be valuable.

Tacoma is, of course, a city of considerable size; and accordingly it is not surprising to find it well lighted by arc lights, while there are incandescents in many private establishments. There is a complete electric fire alarm system recently put in; and electric cars propelled by the Sprague single trolley system run to every part of the city. Workmen are now engaged in stringing the wires for the electric power company; and there is talk of extending the railways into several of the growing suburbs.

Tacoma is only a sample of the rising cities here. At North Yakima an electric lighting plant is being constructed, and it will be followed by a street railway. Port Townsend, north of here, on Puget Sound, is soon to have an electric road; and the two places, Hoquiam and Aberdeen, are agitating the question of building an electric road between them, and getting some company to operate it and furnish electric power.

The electric companies here receive greater inducements than in the East. There they frequently have to pay for their franchises; while here they are often given bonuses, in the shape of land and money.

Tacoma, Wash., June 10, 1890. H. L.

United Telegram Company.

Commencing June 15th, quotation service in Boston, which had previously been furnished by the Financial Telegram Company, will be furnished by the United Telegram Company. The directors of the new company are William H. Baker, vice-president of the Postal Telegraph Company; John O. Stevens, secretary of said company; Edward C. Platt, treasurer of the Commercial Cable Company; Gen. Oscar H. La Grange, former director of the mint of San Francisco, and William B. McNeice, all doing business in New York; Capt. Nathan P. Carver and Eugene P. Carver, of this city. The officers are: Gen. La Grange, president; Capt. Carver, vice-president, and Eugene P. Carver, secretary and treasurer. The United Telegram Company expects to report stock and grain quotations and financial and commercial news in different cities in New England, and the company will act under contracts with the Postal Telegraph Company and John W. Mackay and other persons and corporations from whom it may be able to obtain news of that nature. The title to the patents which cover the tickers formerly owned by the Commercial Telegram Company, of New York, were obtained by Mr. Mackay as a judgment creditor of said company. The United Telegram Company for the present will occupy the office formerly occupied by the Financial Telegram Company.

Blowing Organs by Electricity.

The "C. & C." Electric Motor Company, with true progressiveness, have devoted their energies to a comparatively new application of electric power, that of blowing church organs by means of an electric motor. The majority of church organs are blown by hand, but, judging from the perfection to which the "C. & C." Company have brought this branch of power distribution and the flattering testimonials which they have received, it will not be long before the human organ blower will have to seek new fields in which to expend his genius—and wind. In nearly all the large New York churches the "C. & C." Company have already established plants.

Probably no problem in organ blowing was as difficult to solve as that of efficiently blowing the large organ in Old Trinity. Our illustrations show the application of power to both the gallery and chancel organs. The scale of the pipes is larger than any other in this country, and many stops have from time to time been added to it without at the same time enlarging the bellows. The bellows, as originally designed, were too small for the work which they had to do, and the needed addition to them was never made. To answer satisfactorily, therefore, this great demand, was indeed a problem, but the electric motor, as installed, satisfies all the requirements put upon it, and it would be difficult to suggest the slightest improvement that could be made to the plant.

The organ is located virtually in the main body of the church, the large ornamented pipes that form its front, merely shutting out the view of the more unsightly portion behind, and any noise made there is instantly caught by the arch overhead and made to reverberate through the building. Even here, however, the electric motor performs its work so noiselessly that nowhere in the church is the slightest sound from it perceptible, a result which it is safe to assume that electricity alone could attain. The cut on this page shows clearly how this motor is attached to the organ. The belt from the motor runs to a large pulley on the counter shaft on which are two driving pulleys leading to pulleys on the driving shaft. Each bellows controls a part of the organ. They are both automatic in their working and when full, are made to cut-off. When, however, one part is used beyond its capacity, an automatic arrangement opens a connection between both bellows causing the secondary bellows to aid the primary, thus insuring an abundance of wind without straining either bellows. The motor is started from the keyboard and since full power can be obtained at any instant, a power of tone never before heard surprises even those who are most familiar with this grand old organ. The chancel organ is clearly shown in the cut and hardly requires further explanation. A similar arrangement is found in the case of the organs of St. Patrick's Cathedral. Here the small organ is so placed that the motor has to stand in the very chancel, but it is impossible to perceive the slightest sound from it. The speed of the motor in this case is regulated by a resistance box. The lever on the box is connected to the bellows, and their movement causes more or less resistance to be thrown into the motor, thus automatically regulating its speed to conform with the needs of the organ.

Each organ must have its own resistance box, and it is only by knowing the size of the bellows, weight to be lifted and the number of strokes, that the dimensions of the box can be determined. With the proper resistance in the box, the bellows will automatically control the speed of the motor with absolute exactness.

Another feature is the method of winding the motor so as to admit of its reaching its maximum speed in much quicker time than the average engine, thus enabling the organist, while playing the lightest combinations, to suddenly draw on full organ without exhausting the wind before the motor has again attained its full speed and begun filling the bellows.

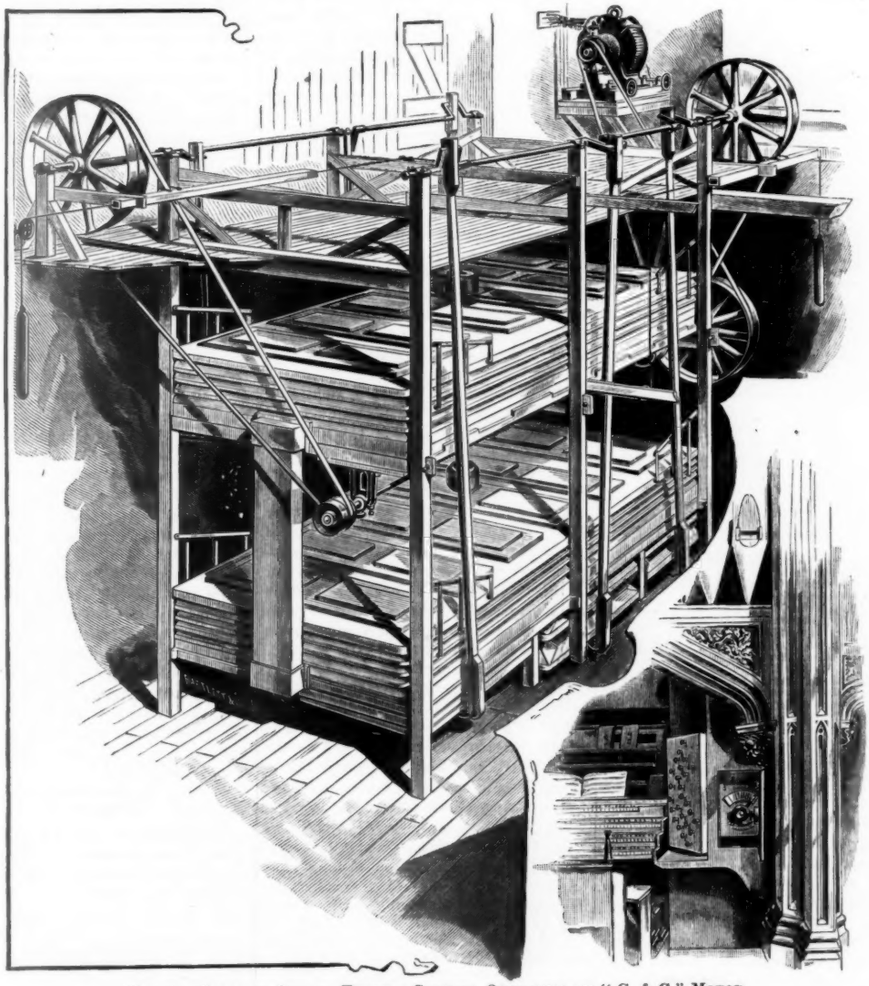

FIG. 2.—GALLERY ORGAN, TRINITY CHURCH, OPERATED BY "C. & C." MOTOR.

San Francisco, Cal.—The Round the World Whispering Telephone Company, of California; directors, A. P. Braython, Alvan D. Brock, J. H. Redstone, Bernard Shraft, E. L. Steen, J. J. Martin.

A Successful Telegraph Attorney.

Hon. Geo. R. Peck has returned from St. Louis, where he took charge of the law department of the St. Louis and San Francisco Railway Company, the Santa Fe's recent acquisition. His election as general solicitor of that company has not yet been formally announced, but will be in a few days. Mr. Peck's jurisdiction has been still further extended by his election as general solicitor of the Atlantic and Pacific Railroad. He has the jurisdiction over more road than any other railroad solicitor in the world.—*Topeka Capital.*

There is no one more deserving of these legal honors than this young Western attorney. His career is without parallel, we believe. Mr. Peck's first conspicuous recognition occurred at St. Louis a few years ago, when he appeared as the attorney of a rival telegraph company to the Western Union, and conducted his case so ably and spoke so eloquently and forcibly, that he won with the odds greatly against him. When it was over, Gen. T. T. Eckert, then, as now, general manager of the Western Union, went over to Mr. Peck, and said: "Young man, we want you. Don't you ever get on the other side again."

Whether he ever got on the other side or not, Mr. Peck has certainly kept on the winning side, and to-day is probably the best paid and most popular railroad attorney in the country, with the largest responsibilities. And all his honors are deserved, just recognition of ability and conscientious work.

Great Demand for Copper.

The statistics of the copper market show that the stocks are decreasing. The total in England and France, and advised and afloat, was 82,041 tons on the 31st ult., against 90,230 tons on April 30, and 117,420 tons on May 31, 1889. The statistical position, therefore, fully warrants the inference that the consumption is outpacing the production, and it is quite on the cards that yet higher prices may be looked for.—*N. Y. Daily Financial News.*

Chicago, Ill.— The Consumers' Electric Light Company.

New York, N. Y.— The Hobby Electric Light Company; capital, $50,000.

Mineral Point, Ill.—Mineral Point Electric Light Company; capital, $10,000.

Grand Forks, Minn.—The Grank Forks Water, Light and Power Company; capital, $100,000.

Warren, O.—The Packard Electric Company; capital, $40,000. Incorporators, J. W. Packard, W. D. Packard, Jacob Perkins, M. B. Taylor and C. F. Clapp.

Independence, Iowa.—Articles of incorporation were filed with the secretary of state by the Independent Electric Light Company, of Independence. Capital stock, $30,000.

Wooster, O.—Wooster Schuyler Electric Light Company; increase of capital stock from $25,000 to $50,000, and amendment changing name to the Wooster Electric Company.

Ware, Mass.—The Ware Power and Improvement Company; to furnish electric light and power. Capital, $10,000. W. S. Hyde, treasurer; R. H. Loomis, secretary; Dr. W. W. Miner and Andrew Bryson, directors.

Des Moines, Ia.—National Railway Electric Signal Company; capital stock, $1,500,000. Officers: President, W. J. Ham; vice-president, Don M. Fike; secretary, S. L. Fuller; treasurer, W. P. Graham. The other stockholder and director is A. J. Baker.

Batesville, Ark.—Articles of incorporation of the Batesville City Railway Company have been filed in the office of the secretary of state. The capital stock is $10,000, of which $6,500 have been subscribed. The officers are Maxwell Coffin, president; D. E. Ewing, vice-president; John W. Glenn, secretary; and S. A. Hail, treasurer.

Trenton, N. J.— The North American Company; capital, $50,000,000. Among other kinds of business, to purchase, sell and operate telephone and telegraph lines. The company is believed to be connected with the Oregon Transcontinental Company. Incorporators, Edward Q. Keasbury, Newark; Cora N. Williams, Summit; Charles L. Bargmeyer, Rahway.

Ogden City, Utah.—Articles of incorporation of the Citizens' Electric Light Company were filed with Probate Judge R. W. Cross, at Salt Lake City. The principal place of business is Ogden City. The business agreed upon is to supply Ogden City and the citizens thereof with electric light. The capital stock is $30,000, divided into 1,200 shares, of the par value of $25 each. For the first year the officers will be the following: Fred. J. Kiesel, president; H. W. Smith, first vice-president; William Schansenbach, second vice-president; Theodore Schansenbach, secretary; John A. Boyle, treasurer. Frank C. Priestly has been chosen as superintendent.

The National Electric Light Association.

At a meeting of the executive committee, held in New York, Monday, June 16th, it was decided to convene the Twelfth Convention of the National Electric Light Association at Cape May, N. J., on Tuesday, August 19th. Full details of the arrangements made for the Convention will be published at a later date. The Stockton Hotel is the place of meeting.

Mr. Allen R. Foote entered upon the duties of secretary and treasurer of the Association on Tuesday, June 17th.

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The total number of American patents issued last year reached 23,360, as against 19,585 for 1888. More patents were issued from the Patent Office during 1889, than in any previous year.

The London *Electrician*, impressed, no doubt, like other corpulent bodies, with the necessity of reducing the weight of its bulky issues, now sends copies abroad printed on flimsy, semi-transparent paper. We cannot say that we admire the innovation, as the paper is trying to the eyes, the printing on the back showing through, and unpleasant to handle, owing to its extreme thinness. But then the postage is less.

The electrical editor of a New York contemporary must have been out of town last week. Among the items of telephone news we find the following gem: "A Long Telephone Cable. If Spain is connected with Porto Rica (*sic*) and Cuba, a scheme now under consideration by the Spanish government, there will be laid the longest telephone cable in the world." Needless to say no such scheme ever occurred to the Spanish or any other government; what is proposed is a telegraph cable, as we mentioned last week. Telephony by means of a long submarine cable is not yet even in the shape of a "scheme," as our worthy contemporary ought to know.

At last the journalistic profession has received recognition at the hands of the New York law makers. Editors and reporters will hereafter be excused from jury duty, ranking alongside of lawyers, physicians and clergymen.

From Boston, the seat of learning and accuracy, we learn, through an electrical journal, that "the flagship 'Chicago,' of the European squadron, is equipped with the range-*firing* apparatus, invented by Lieut. Bradley A. Fiske. * * * Should the trial, now in progress, prove successful, there will be a revolution in artillery practice." There can be little doubt but that firing ranges would effect a remarkable revolution in artillery practice, but it must be a somewhat peculiar operation.

Watch the lamp trimmer who has charge of the two arc lights at the corners of Broadway and Vesey and Broadway and Barclay streets. Any morning you may see him trimming the lamps. He is original in his methods. He does not like to do his work from the poles; he must stand on the wires. This may explain how some insulation is worn off, some tie-wires broken and some insulators cracked. We leave out of account the possible danger to the man.

The announcement made by the French daily papers, of the invention of a carpet weaving machine moved by electricity, has caused a protest on the part of some of the journals in question against the production of such labor saving machines, on account of the number of workmen which they displace. Apparently, the French editors are rather rusty in their political economy, or, perhaps, they fear next the invention of an electrical editor for daily papers.

The details of an elaborate "rapid transit" scheme for New York city were recently published in a daily paper. The idea is to have a double-decked elevated road with a surface track underneath, the two elevators to be worked by steam, one for express and the other for way traffic, and the surface line by electricity. The idea seems a good one, but the weak point is the proposal to work only one line by electricity instead of all three. Before very long New Yorkers will not be content to be carried from point to point by the agency of any power other than that furnished by the electric motor.

Connection between the telegraph systems of Tonquin and China has at last been established. The frontier line of the Chinese empire extends about 20,000 miles; the greater part separates the Celestials from Siberia, Asiatic Russia and India, the French frontier being a short stretch of only 240 miles. "Nevertheless," says *La Lumière Electrique*, "it is from this side that electricity has first gained an entrance into the largest country in the world." Our Parisian contemporary considers that an important step in the development of the extreme Orient, and hopes that it will be followed by others in the same direction.

The British postmaster-general is said to consider favorably the suggestion that telegraph messenger boys should be provided with bicycles in order to expedite the delivery of messages. Given the smooth wooden and concrete pavements of London and other English cities, the scheme would, no doubt, answer well, if the natural tendency of boy-bicyclists was not to court disaster by "fancy riding" and reckless racing. Tricycles have long been used in England for the rapid delivery of small packages and the evening editions of the daily papers, in London and other cities, and they are also a great boon to country postmen, who have long rounds to make, often with 50 pounds or so of parcel post matter. We are afraid, however, that the condition of our streets and roads will not permit of a similar use of the iron steed in this country. A messenger boy struggling along Broadway on a bicycle would be a sorry spectacle, indeed, and the chances are that he would deliver the message much sooner on foot; at any rate, a new bicycle would be needed for every trip.

THE ELECTRIC MOTOR VS. THE CABLE.

There now appears to exist an absolute certainty that the fatal mistake is to be made of operating surface railways by cable power in New York city. The experiment is to be tried first on the Third avenue line, but there is also talk of extending the change to Broadway and other thoroughfares. Mr. Frank Sprague said, not long ago, in the course of the discussion following a paper on electric traction, that the construction of a cable system was, from his point of view, rather a good thing than otherwise, as he considered the cable a precursor instead of a rival to electricity.

There certainly have been cases where cable systems have been abandoned and replaced by electrical traction methods, and it is undoubtedly true that given an economical and thoroughly practical conduit system of electric traction, the substitution of the cable plant by electrical appliances will be a remarkably simple and expeditious matter, since all the heavy construction work will have been done and the alterations required will be comparatively unimportant.

At the same time, it is to be hoped that the municipal authorities will gather themselves together and limit the operations of the cable to one line for the present, so that a fair trial may be made of the adaptability of the system to New York conditions and requirements. We are sadly afraid, however, that in hoping thus we are leaning on a frail reed. Our municipal authorities, individually and collectively, have shown such hopeless incapacity in dealing with any questions of an engineering or scientific nature, that it would be demanding too much of them in the present instance to expect that they should raise themselves from the dead level of crass ignorance and phenomenal stupidity along which they seem doomed to travel until public forbearance is taxed beyond endurance.

We are glad to see that the daily press is not blind to the merits of electric traction and to its superiority over the cable. For instance, the New York *Times*, in a recent editorial on the cable scheme, said: "Doubtless, the old-fashioned horse car is doomed, but the final solution of the problem of local transportation lies rather in the electric motor than the cable, and probably in that actuated by the storage battery." It is gratifying to find such sensible utterances in the lay press, and the oftener they are repeated, thus joining the influence of the daily papers to that of the technical journals, the sooner will the complete sway of the electric motor be asserted, and the comfort and convenience of the traveling public be properly secured.

PERSONAL.

Joseph A. Kerbey, a well-known telegraph operator and journalist, of Washington, D. C., has been nominated by the President as consul to Para, Brazil.

Mr. W. H. McGrath, formerly of the Brush Illuminating Company, of this city, is the New Orleans manager for the Fort Wayne Electric Company.

Mr. Albert J. Corriveau, a prominent electrical man, of Montreal, was a New York visitor last week, and was shown the electrical mysteries of the metropolis by Mr. W. J. Morrison.

Col. T. F. Walton, of Cape May, was a New York visitor last week, arranging for the comfort of his electric light visitors during the August convention, which will be held at his great hotel, the Stockton.

One of the best and most artistically lighted drug stores in the city is Dr. Charles Perry's, in the *Sun* building. "Perry's Pharmacy," located in Newspaper Row, is well known among New York journalists.

The Waterhouse Brothers, well known in the electrical field, one of whom was the inventor of the Waterhouse system now owned by the Westinghouse Electric Company, have severed their connection with the last named company, and are said to be engaged on their own account in the development of something new in the electric line.

CORRESPONDENCE.

Electrical Happenings in Washington, Philadelphia and Boston.

OUR PHILADELPHIA LETTER.

Mr. Charles A. Bragg thinks that the electrical business in this city will be very prosperous in the Fall. The Westinghouse office is in receipt of more than the usual number of inquiries regarding apparatus of all descriptions. Both Mr. Bragg and Mr. Porter are to be congratulated on their cool and cosy offices. It is no wonder business flows their way, for if once these persuasive gentlemen get a fellow in their little den, another Westinghouse triumph results. Two little United States motor fans keep the rooms at a delightful temperature. If any of Mr. Bragg's electrical friends want a nice, easy Summer position, I would suggest that he can supply them with one. Just go in and tell him your latest and biggest fish story. He will hand you a card giving the details about a society in need of members, and the name of the secretary 'tis Ananias.

The Electrical Plant is being rapidly installed in the new Public Buildings. This is another contract obtained by the Philadelphia office of the Westinghouse Company. Competition on the contract was very sharp, but the Westinghouse apparatus seemed to suit the City Dads; *ergo*, it is a Westinghouse installation. The plant at present will consist of two 1,000-light United States dynamos, driven by two 100 horse-power, high speed, compound Westinghouse engines. The building is being wired by the North American Construction Company.

Chadbourne, Hazelton & Company are pushing the Wenstrom apparatus strongly. The business prospects of the company are very bright, and great things may be expected of them. The manufactory at Baltimore is being completed as rapidly as possible. About 15 sections of territory have been let to bright and energetic young men, who have taken hold of the business in a thoroughly progressive manner. It is a significant sign of the times that the large majority of the gentlemen connected with this company are young men.

The United Electric Equipment Company is a corporation which has recently gone into business, and is making a strong bid for public favor. This is another association of young and earnest men. These are the officers of the company: B. Marsden Vaughan, president; Charles R. Eberle, vice-president and general manager; William J. Merrill, secretary, Henry N. Almy, treasurer. They control the sale of the Wenstrom apparatus in a large territory, and have established branch offices at Chicago, Washington, Pittsburgh, Wilmington, Del., and Wilkes Barre, Pa. Besides the Wenstrom apparatus, they have very complete systems of fire alarms, electric railways, lighting, power, elevators and mining machinery. Pleasantly located offices are occupied at 706 Walnut street, where model apparatus is on exhibition.

On the whole, the outlook in the electrical field in this city is very good. The hot weather has a depressing influence on almost every business, but electrical fans are the great drawing card to larger and better contracts. Besides, an electrical fan is a first-class advertisement. S. L. C.

Philadelphia, June 20, 1890.

OUR BOSTON LETTER.

Mr. H. F. Kellogg, of the Thomson-Houston Electric Company, has returned to his home in this city, after an absence of nearly a year, having been located during that period in Mexico looking after the interests of his company in that country.

Messrs. Goodnow & Wightman, one of the oldest hardware firms in New England, have removed from No. 176 Washington street, this city, to No. 63 Sudbury street. This firm has added to its large and rapidly growing business an electrical supply department stocked with a full line of electrical goods and electric light supplies.

The New England Wiring and Construction Company, of this city, has been awarded the contract for erecting poles, stringing wires and supplying outdoor fixtures for lighting the streets of the town of Groveton, N. H., with electric lights. The above named company is one of the oldest and among the most reliable construction concerns in the country, in fact, the oldest established company in its line in this section. For several years past it has had in hand most, if not all, of the wiring and construction work of the isolated electric light plants installed by the Edison Company in New England.

Old Wires Re-Covered.—The American Circular Loom Company, of this city, have a patent woven process by which old wires of any manufacture may be re-covered. This covering is not braided, but woven like a canvas jacket around the old wire, and is said to be thoroughly fireproof, possessing remarkable tensile strength and excellent insulating qualities.

Removals.—About July 1, the Standard Electric Company, of Vermont, will remove its Boston offices and salesrooms from No. 161 Franklin street to a magnificent suite of rooms in the New England Building, Nos. 180 to 188 Summer street.

Messrs. H. E. Swift & Company, manufacturing electricians, at No. 62 Sudbury street, this city, will remove to No. 34 Oliver street, about July 1.

The Jewell Belting Company, of Hartford, has been compelled to double the capacity of its tannery at Jellico, Tenn., owing to the great demand for its celebrated short lap oak belting. This company also operates another large oak tannery at Rome, Ga. All the leather used by them in the manufacture of belting comes from these tanneries, and the demand is so great that further enlargements are contemplated in the near future.

Election of Officers.—The Thomson-Houston International Electric Company held its annual meeting at Portland, Me., last Monday, and elected the following directors for the ensuing year: Messrs. F. S. Pevear, C. H. Newhall, J. N. Smith, B. F. Spinney and J. S. Bartlett, of Lynn, Mass., and Messrs. Oliver Ames and Geo. W. Davenport, of Boston.

The Brown Electric Protector Company, of this city, is in receipt of many complimentary letters regarding the merits of the Brown protecting device for telephones, telegraph instruments and fire alarm apparatus. Most of these testimonials are from superintendents of telephone exchanges, managers of telegraph offices and officials at fire alarm stations, who have given the Brown protector a thorough test. The officers of the Gamewell Fire Alarm Company have given the protector their endorsement and have signified their intention to adopt the device with future installations of the Gamewell system.

New Electric Light Station.—Advices from Pittsfield, Mass., under date of June 20, state that "the Pittsfield Illuminating Company will soon break ground for the erection of its new electric light station. The new building will be about 50x100 feet, with basement and one story. The facilities will be large enough for furnishing power for motors for manufacturing purposes and for the street railway, if necessary. A new 450 horse-power boiler will be put in and new engines. The company, in addition to supplying light and power, proposes to furnish steam heat for business houses in its vicinity, using for this purpose the exhaust steam from its works."

Boston's New Telephone Building.—A gentleman familiar with the facts says: "The New England Telephone and Telegraph Company has quite outgrown its quarters at No. 50 Pearl street, and welcomes the near completion of the American Bell Telephone Company's new building, at the corner of Milk and Oliver streets. The operating room of the New England Company will be on the ninth floor of the new building and will be fitted with new multiple switchboards of the latest pattern, which are now being manufactured by the Western Electric Company, of Chicago, and will accommodate 5,000 subscribers. This new multiple board will cost in the neighborhood of $100,000. The general offices of the company are to be on the eighth floor, giving a grand view of the harbor and the surrounding shores. The wires will all enter the building by underground cable, and will extend to the operating room through a large shaft or well hole. The work of removal will be arduous, but without interruption of the service."

New Electric Car.—The new eight wheel electric car, built by the Tripp Manufacturing Company, of this city, for the West End Street Railway Company, had a trial trip on last Thursday evening, and, by invitation of the first named company, about 30 gentlemen enjoyed a ride over various branches of the West End electric system, including a "flying trip" over the Brighton branch to Coolidge Corner. The mammoth car moved gracefully over the tracks, without the customary jarring and shaking incident to the smaller cars. The car easily turned all the curves, excepting that at the corner of Sudbury and Merrimac streets, which has a radius of 28 feet, and is said to be the sharpest curve on the West End Railway. At Park Square the car turned the 40-foot radius with ease. The new car is 28 feet long from door to door, 7 feet 3 inches wide, 7 feet 9 inches in height inside, and has a seating capacity of 46 passengers, 23 on each side—more than double the seats in a common box car. The seats are luxuriously cushioned, and at night the car is lighted by a half score of incandescent lamps. The car is mounted on two trucks, one at each end, and each truck has four 30-inch steel wheels, and one 15 horse-power Thomson-Houston motor. The car is provided not only with the common hand brake, but also a vacuum brake, and it is possible to stop very quickly, even when going at high speed. The Tripp anti-friction bearings are used throughout, and the trucks are of an entirely new design (on which patents are pending), the equalizing bar being connected to the journal boxes underneath, instead of passing around the top, as usual. The car is also provided with the Jewett frictionless car centers, which carry the weight of the car on frictionless rollers that move with the slightest strain, permitting the car to adjust itself to the movement of the trucks.

McIntosh & Seymour Engines.—Mr. J. A. Grant, of this city, representing the sales department of the McIntosh & Seymour Engine Company, has just consummated arrangements by which all the company's business in the Western States shall be manipulated by a new corporation which has just been formed, and comprises a number of the most prominent electrical and mechanical business men in the West. This new corporation, it is said, has unlimited capital at its disposal. In its operations it is planned to do general steam plant and construction work. In spite of the fact that the McIntosh & Seymour Engine Works have been quadrupled in the past year, it begins to look as if another addition to the company's manufacturing facilities will be necessary to fill the rapidly increasing orders.

Boston Electric Club Anniversary.—To-day about 40 of the members of the Boston Electric Club celebrated the third anniversary of the formation of that organization by an outing at the seaside. At 12.30 o'clock, 30 members stepped into the special car awaiting them at the Eastern Depot of the Boston and Maine Railroad, and were soon bowling over the tracks, bound for Marblehead Neck. When the train stopped at Lynn, ten additional members, headed by Chairman Robrer, of the House Committee, joined the Boston delegation. At 1.30 o'clock, the party arrived at Marblehead station, where three barges stood ready to carry them to the Nanepashemet House, at Marblehead Neck. A half hour ride over a splendid road, lined on either side by attractive and diversified scenery, brought the hungry but happy party to its destination. By two o'clock the party had taken their seats about the dinner table and were called to order by President Henry B. Cram, who fully appreciated the situation by making his anniversary address very brief.

The neatly arranged and palatable fish dinner was soon over, and 40 smiling individuals sallied happily forth from the dining room.

Two picked base ball nines were soon formed, and then the fun began.

The game was full to overflowing with funny incidents and comical scenes. An ordinary one base hit frequently yielded a home run. Several excellent hits were made, three times the ball was batted over the bluff, nearly 200 feet distant, and Mr. Eustis, of the Eastern Electric Cable Company, knocked out a home run by hitting the ball into the ocean. As a "coacher," Mr. A. B. Griggs won quite an enviable reputation, being second only in standing to the great ball player of the club, Mr. W. E. Stow. Other members deserve special mention for peculiar points and fine plays made on the field. At the end of the second inning the umpire called the game and declared the score 24 to 16; but as neither of the picked nines had been named previous to the game, pity for the defeated side justifies that the names of the players be omitted. At six o'clock, the majority of the party embarked in the barges and were quickly driven to the depot. On board the train the party made things lively with singing and speech-making, and the return trip to Boston was a joyous occasion for every one.

Electric Stocks.—Boston quotations, at closing hour of the Exchange, Saturday, June 21, were as follows:

Thomson-Houston Electric Co.	67¼
" " Preferred	96¾
" " Series C.	17¾
" " Series D.	8¼
Thomson Electric Welding Co	.230.
" European Welding Co.	112.
Westinghouse Electric Co.	39¾
Fort Wayne Electric Co.	13¾
Eastern Electric Cable Co.	65.
" " preferred	51¼
Gethins Electrical Manufacturing Co.	2¾
Union Electric Car Co.	7¾
Electrical Safety Co.	5.
Western Union.	85⅝
TELEPHONE:	
American Bell.	240.
Erie.	46.
New England.	54.
Mexican.	1.
Tropical American.	1.15

Boston, June 21, 1890. W. I. B.

OUR WASHINGTON LETTER.

The Influence of Representatives of electrical industries which has been brought to bear on the Senate Finance Committee has had the effect of placing mica again on the free list, instead of leaving it subject to a duty of 35 per cent. *ad valorem*, as was provided in the tariff bill passed by the House. The matter will still need some attention from interested parties to prevent the stove-mica men from getting a heavy tax put upon this article.

In the Tariff Bill, as amended by the Senate Finance Committee, copper ores are taxed one-half of one per cent. per pound, instead of one and one-fourth cents; and copper in plates, bars, ingots and pigs, is changed from two cents to one and one-fourth cents per pound. G. C. M.

June 21.

* * At Wichita, 250 men are at work on the new electric road.

* * It is probable that the Newark electric railways will be in operation by July 1.

* * The Union Street Railroad Company, of Saginaw, Mich., have sued the Michigan Central Railroad Company for $20,000 damages for cutting the wires of the street railway on May 16.

* * The West End Street Railway Company, Boston; has just declared a dividend of four per cent. on the preferred stock and five per cent. on the common, payable July 1, to stockholders of record June 14.

* * The perfection of ventilation is now attained by electricity. The new United States man-of-war "Baltimore" is supplied with an electrical ventilator which will change the atmosphere of the engine room completely in two minutes.

* * An electric street railway is to be built between Haverhill and Lawrence, Mass. Work will be commenced as soon as grants for tracks are secured in the cities. New York parties are interested with C. W. Morse and B. B. Jones, of Haverhill.

* * Patents have been allowed to Messrs. Wills & Hardy for a self-oiling trolley wheel. These have been in use on the electrical cars in Nashville, Tenn., for several months. All 50 cars have them on. The oil chamber is filled once a week.

* * The officers of the Electric Railway Company, of Atchison, Kans, are W. W. Hetherington, president; H. J. Ranson, vice president; Geo. Storch, treasurer; J. W. Orr, secretary; G. H. Williams, assistant secretary. Mr. Ranson and Mr. Williams live in Des Moines. Mr. Hetherington has no doubt that the electric line will be in operation by early Fall.

Annual Outing.

The staff of the James Kempster Printing Company, the well-known electrical printing establishment, of Cedar street, New York, enjoyed their annual holiday, at New Dorp, S. I., on Saturday last. There were about 90 present, and, notwithstanding the rain, all enjoyed the day. The programme of games was only partly carried out, on account of the rain, and will be finished at another time. The 100 yards dash was won by Wm. Grogan (scratch); J. Rilé (3 yards), second; and Geo. Russell (8 yards), third. Putting 16 pound shot—C. Corke (10 feet), first; C. Rhoades (10 feet), second; and J. Kennedy (10 feet), third.

These annual pic-nics are very popular with the printers, and it is but natural that such thorough and capable workers should also know so well how to enjoy themselves.

A New Construction Company.

The organization of the Western Power Construction Company, which was recently consummated by a party of capitalists, will fill a long-felt want throughout the Western States. This company after their organization purchased the business of W. P. Adams & Company, thereby securing the agency of the McIntosh & Seymour engine, the reputation of which is rapidly growing, the engine already having a strong foothold in the Eastern States and is classed as A 1 among high speed engines. The company will occupy offices at 144 Adams street, Rookery Building, Chicago, and are prepared to make proposals for the complete erection and construction of power plants in territory from the Alleghany mountains to the Pacific Coast, of any description, using any system desired, although they will make a specialty of the McIntosh & Seymour engine.

This is the only company of this exact nature in the country, which fact should be appreciated by all companies who contemplate the erection of steam plants. The management has been placed in the hands of Waldo P. Adams, which will greatly tend to ensure the new company success.

Mr. J. E. Wilson, who was formerly a partner of Mr. Adams, will occupy a prominent position with the concern.

Although the life of the W. P. Adams Company was short, they report having sold, before their absorption in the new company, 2,650 horse-power in McIntosh & Seymour engines.

Telephonic News

⁂ The Bell Telephone Company, of St. Louis, is asking for an underground ordinance and one has been reported favorably to the city council by a special committee.

⁂ M. Bursual, the French electrician, has been presented to M. Jules Roche, Minister of Commerce. M. Roche declares that M. Bursual is a rival of Edison, and that he is the real inventor of the telephone, having discovered and applied the principle 20 years in advance of either Edison or Bell. M. Roche has instructed M. Bursual to undertake the improvement of the extremely defective telephone service of Paris and the provinces.

⁂ Press despatches state that the contract of the Mexican Telephone Company with the city government for the use of the streets for poles expires very shortly, and the contract with the Federal government for the use of the highways and government thoroughfares and the privilege of free importation of materials must soon be renewed. Two European companies are competing for them. The old company is likely to retain its hold, despite opposition.

⁂ The telephone must have a new role of usefulness scored for it. Sir Humphrey de Trafford, near Manchester, has, perhaps, the finest kennels in England, the kennelman's house adjoining them. From each kennel a telephone arrangement leads to the kennelman's room, so that when any dog is noisy at night the keeper can speak to him so as to be heard without leaving his room.—*Chicago Herald.* As DeWolf Hopper says to his clerk, in "Castles in the Air," in the same spirit do we address the *Herald:* "Take it off! Take it off!"

⁂ The most unsatisfactory telephone operator is the member of the masculine sex. The tones of a young man answering a call can never be sweet and soothing, when compared with the gentle voice of a young lady. This is one chief reason why the feminine gender is so universally drawn upon for central telephone exchange operators, and explains why the Metropolitan Company, of this city, has placed young ladies in charge of the Sunday work. Some of the large exchanges, notably the Brooklyn exchange, have young ladies to answer the night calls. Telephone exchanges have opened a new field for the particular talent of the gentle-voiced sex, and they are rapidly becoming expert and successful.

⁂ An exhibition of the working of the long distance telephone was given at the rooms of the Board of Trade, in Reading, Pa., last week. Wires had been brought into the rooms and connected with the long distance system. A loud speaking attachment was adjusted, and some 30 or 40 gentlemen listened to the playing of national airs on the cornet in the general office of the company, 18 Cortlandt street, New York, 150 miles away. They were also regaled with a song of a celebrated darkie dock rat, produced from a phonographic cylinder. Afterwards the 'phone was connected with a New York theatre, and the spectators in Reading had the pleasure of enjoying a part of the performance. During the time of the exhibition there were no less than six thunder storms raging between Reading and New York.

⁂ The Erie Telephone Company now operates through three sub companies, one of the sub companies being divided into three divisions, making in all five divisions, as follows: Arkansas division, the State of Arkansas; north Texas division, all that part of Texas north of a line drawn through the State from east to west at Waco; South Texas division, all of the State south of this line; Northwestern division, the States of Minnesota, North and South Dakota, and six counties in Wisconsin bordering on the Mississippi river; Cleveland division, the city of Cleveland and all of Cuyahoga county in Ohio. The net increase of subscribers for the month of May is as follows: Arkansas division, 12; North Texas, 23; South Texas, 31; Cleveland, 49; Northwestern, 70; total, 185. Total increase for the first two months of this fiscal year, 292.

The Telephone in Belgium.

A correspondent in our London namesake writes of the Belgian Telephone Company, as follows: This company, which carries on its operations in Brussels, Antwerp, Charleroi, Ghent, La Louvriere and Verviers, has recently published the results of its work during 1889. They show that the position of telephonic matters in Belgium is a very flourishing one.

Up to December 31, 1889, the number of subscribers reached 4,394, an increase of 343, or 8.46 per cent. over the previous year.

The nominal capital is 3,400,000 francs, consisting of 13,6 0 shares of 250 francs and 5,000 founders' shares (the value of which is not named). The actual capital subscribed is 2,635,000 francs.

The installation of the company is valued as follows:

	Francs.
Local installations	1,699,129.95
Interurban and international installations	81,541.99
Private installations	11,770.31
Public "	40,956.31
	1,833,398.56

The subscriptions received in 1889, amounted to 889,451.47 francs; and other work carried out by the company, in the shape of electric light wires, private installations, etc., realised 4,081.01 francs. Deducting from the net total 400,803.19 francs for reserve, there remains 267,142.91 francs available for dividends, allowing the distribution of the following: 17.50 francs per share of 250 francs, that is, seven per cent., and 13.60 francs to each of the 5,000 founders' shares.

The era of large dividends appears, therefore, to have commenced—a fortunate circumstance; for the right to purchase the concessions at the end of 1892 is reserved by the Government, and the price of the purchase is represented by a rental equal to the mean net revenue of the last three years, increased by 15 per cent.

Let me add, that as usual, the principal organs of the Belgian Press periodically call for the acquisition by the State of all the telephones.

An Electric Elevator.

Architect Fred. Kees, of the firm of Long & Kees, has invented and is having patented an electric appliance for passenger and freight elevators. The power is applied by a sheave similar to the one now in use in the crane elevators. The pulleys in the sheave are moved by means of a long screw, which runs through the frame in which the pulleys are set. This screw, by being turned, increases the distance between the sets of pulleys, taking up the rope and raising the car. The screw is turned by an electric motor, and there is absolutely no limit as to its speed. Like most elevators, the cable will ascend the shaft, run over a pulley at the top and down into the basement. Here the motor and the elevating sheave will be placed, and by a simple touch of a button the car can be started or stopped at any moment.

Application for a patent is now pending. It is said the elevator can easily compete in price with any now made, and some tempting offers for the invention have already been received. As soon as a patent is issued, the Business Men's Association will discuss a proposition to form a stock company for its manufacture in Minneapolis.—*St. Paul Pioneer Press.*

Secrecy and Silence.

Aristotle, when asked the most difficult thing to execute, replied: "To be secret and silent."

It has so happened, sometimes, that the secrets of great discoveries have been so carefully guarded that for a season the most curious eye has been defeated in its efforts to pry into the shops and laboratories where the process of manufacture was executed. But seldom do manufacturers nowadays trust their secrets to the protection bolts and locks give them. They have found out that the best protection is a patent, which gives them a weapon with which to defend their interests, which secrecy fails to do.—*London Invention.*

Lightning Rods.

Those who most fully understand the power of the electric current are least favorably impressed with the attempted methods of drawing off that current from the atmosphere during an electric discharge, says the Boston *Manufacturers' Gazette.* Both the size and composition of the rods are inadequate and unsatisfactory for carrying off so heavy a discharge. Iron is one of the poorest conductors, especially as compound with copper or zinc,

A copper rod to be efficient should be at least three-fourths of an inch in diameter. An iron rod to be of equal efficiency should be eight times the size of the copper rod, as copper has eight times the conductive capacity of iron. If parties are to employ iron rods, then galvanized iron is better than the common iron, by reason of the coating, which protects it from rust.

As to the matter of insulation. Any known insulator, be it glass or wood, or any of the common forms of insulation, are entirely inadequate during a heavy electric discharge from the clouds. To indicate the enormous electro-motive force of the ordinary electric storm, it might be well to compare the artificial lightning produced by human beings. The ordinary induction coil, with a voltage beyond measurement at the present stage of the art, only creates a spark varying in length from one-half inch to three inches. Such a spark is difficult to insulate, as it will pierce glass of the thickness of one-eighth of an inch, and wood or paper two or three times as thick. Now, let us compare such a diminutive spark with a discharge of lightning, which has been known to reach one mile in length. If the spark of the induction coil, measuring two or three inches in length, pierces glass or wood as above, what must be the insulation required to control a spark or discharge half a mile to one mile in length, with all the batteries of the sky, and with an electro-motive force millions of times beyond the computation of man.

It is apparent that the usual insulators used on buildings must be entirely inadequate for such a purpose. In many electric storms, where the discharge follows the wire, it divides in many instances, part of the discharge following the wire and part of the discharge, regardless of any insulator commonly used, entering the house at one or more points; and, for all practical purposes, the building stands in a worse position than though its owner had not attempted to protect it with the ordinary lightning rod.

In the ordinary electric storm a house would usually fare better without the protection of the lightning rods, because the electric clouds in their discharge would naturally strike a tree, a high rock or some other elevated object in proximity to the house, and would not be attracted to the house by the iron or copper rod. In other words, if the lightning rod will do what is claimed by the manufacturer, it becomes at once a dangerous fixture, simply because if it does attract the electricity it affords no adequate means of taking care of it; and it would be far better to let the cloud discharge at some other point than the house, rather than to take the risk of its discharge down the conductor, with almost a certainty of its dividing up and entering the house, irrespective of any insulation known to the arts.

Lightning always takes the shortest conductor to the earth, and, undoubtedly, tall trees in the vicinity of a house are an efficient safeguard. It has been suggested by experts in electricity that a very efficient safeguard would be to run a large iron or copper conductor into a tree, and then if the lightning was attracted to the tree or the conductor, and it divided up in its passage to the earth, no damage would be done to near-by buildings.

One thing may be safely said, that if a discharge of lightning from a cloud is pointed directly towards a house, there is no human means of diverting it from its course, or preventing its passage in the direction which it has taken, and all the feather beds and lightning conductors that might be provided would scarcely protect a person who stood in the way of the current. It is a well-known fact among observers that the presence of lightning rods upon houses has often failed of providing the expected protection, and there are millions of houses unprotected by lightning rods that have never been struck by lightning.

If one stops to consider the enormous current to be dealt with, and the tremendous electro-motive force of such a current, it is plain to be seen that no human method can be devised for safely taking such a current out of harm's way; and the man who sits in his house during a thunder storm protected by iron lightning rods the size of his little finger, and insulated with pieces of glass, which are no more protection than pieces of tissue paper, has not the safe protection which the lightning rod man promised, and his money were better invested in some other purposes about his buildings.

As a matter of comparison in insulation, it is generally known that telegraph wires are insulated by glass insulators, fully an inch in non-conducting surface, with glass sides fully one-quarter of an inch in thickness. And yet all this precaution in insulation is taken with a current not exceeding 400 volts of electro-motive force. Leakage is a troublesome factor even then. What shall we say when the lightning rod man places similar glass insulators on your house to protect your little iron rods from discharging into your buildings the lightning of the heavens, whose electro-motive force cannot be measured even by billions of volts. It is like comparing the pop gun with the thousand-pound Columbiad.

In the progress of an electric storm there is no special attraction in an ordinary dwelling house why the discharge should select that medium for reaching the ground. Trees, rocks, moist earth, soil with minerals, are equal if not better conductors than ordinary houses and barns. If the electricity in a storm cloud has reached sufficient tension to overcome the resistance offered to its passage to the earth, it will discharge at that point and at that time, and no human effort or contrivance can change its course.

The Range Finder.

Apropos of the Fisk electric range finder, of which so much has been said, the *Army and Navy Journal* draws attention to the fact that a report signed by ten members of the American Institute, in 1844, describes an instrument then in actual use in the United States Navy, which measured distances by which the requisite elevation to be given to the gun could be instantly determined. A naval officer in an official report to the Navy Department, made at the same time, says of this invention: "The distance of the ship to any object is readily ascertained with an instrument on board contrived for that purpose, by an observation which it requires but an instant to make and by inspection without calculation." The fact that the earlier range finder, the merits of which were certified to by its use in our navy, by the approval of the American Institute, and by the award of a prize medal by the London Exhibition of 1852, after a practical test of the instrument for eight years, was finally rejected and lost sight of—seem to indicate that there is some inherent difficulty in the use of a range finder at sea, at least, that is just as likely to remain in force in the electric as in the old style.

A Good Scheme.

"An electrical engineer, of Buffalo, who has been spending a few days in Cleveland," says the *Marine Review*, "suggests what seems to be a practical plan in reducing very largely the cost of transportation on the Erie canal. His plan is to apply a trolley, now generally in use on street railways, to the canal. If the overhead trolley system can be applied to street railways at a cost of about half that of horse-power, he argues, why can it not be made to take the place of canal mules with a similar reduction in cost? The poles and other appliances for the overhead wires, and, in fact, the whole plant, covering the entire length of the canal, could be readily arranged without hindrance to navigation. The span would not be too wide at any point. Power stations could be so located as to operate sections of 30 miles on either side, being 60 miles apart, and at some points water might be utilized. The great objection to the propeller system would, of course, be the damage to the canal banks through the action of the wheels, but the promoter of this scheme suggests the use of a twin screw wheel or a wheel working low in the water. A motor of smaller size than that used on street cars would certainly accomplish more than six mules now used, in caring for two boats, granting that all else was equal. The electricity might be used to light the canal as well as the boats, and a telegraph system could be arranged on the poles used in supporting the trolley wires. One man aboard any of the boats could handle the trolley, and at the same time care for the rudder. The scheme altogether appears practicable."

Pension to the Family of the Late Major Michaelis.

It will be gratifying to the large number of friends of the late Major Michaelis to know that the government is to grant a pension to his family. He was well-known in electrical circles, and numbered many friends in the Electric Club, of New York. The report of the Committee on Pensions, of the House of Representatives, giving a plain statement of the services and accomplishments of Major Michaelis, is the best eulogy that can be written. It is as follows:

Major Michaelis was born in Prussia, and died May 1, 1890, at the age of 46 years, leaving his widow and six children, the eldest of whom is not yet 17 years of age. He was educated at the New York public schools and graduated at the New York Free Academy, at the head of his class, in July, 1863, at the age of 19.

In September following he was commissioned second lieutenant in the United States Signal Corps; in November, 1863, he was promoted to second lieutenant in the United States Ordnance Corps, as the result of a competitive examination, being the first civilian, it is understood, to receive a commission in that corps. In September, 1864, he was promoted to first lieutenant of ordnance, and in March, 1865, was brevetted captain, United States Army, for faithful and meritorious service during the war.

Rising through regular gradations in the service, he became captain in 1874 and major in 1889 in the Ordnance Corps. He shared in the Atlanta and Nashville campaigns, where his merits attracted the attention of his superior officers. He was devoted to his profession, and his scientific genius and vast acquirements as a scholar were freely given to the service of his adopted country. He was a master of several languages, and by this means he was brought into correspondence with many of the ablest ordnance officers in the armies of Europe.

As the result of this intercourse, he received from Major Boulenge, of the Belgian army, one of the then new electric chronographs, invented by that officer for measuring exactly the velocity of projectiles. This was the first chronograph, it is believed, that was introduced into our Army and Navy, and marks the improvement in rifled arms and artillery, which, since the Franco-German war, has compelled the rearming of both the French and German armies at least twice, and similar changes in the other armies. In like manner the navies of the world have been obliged to change their ordnance and defensive armor.

To clearly demonstrate the usefulness of this chronograph, which had superseded the ballistic pendulum in every army but ours, Major Michaelis undertook a series of experiments, which he was allowed to conduct at his own expense at the Watertown arsenal, the results of which were embodied in a treatise entitled "The Boulenge Chronograph," published by Van Nostrand, of New York, in 1872. This treatise conclusively demonstrated the excellence of the new system, and in 1874, Major Michaelis was assigned to conduct the experiments with 12-inch rifled guns at Nut Island, in Boston Harbor, assisted by Lieut. Henry Lyon, and from that time the modern system has been in use in our army. This new departure in scientific ordnance is to be accredited in large part to the intelligent zeal, persistent energy, and scientific knowledge of this officer.

At a very early date, and with great foresight and zeal, he urged the establishment of a government factory for making heavy guns on the most advanced system at a time when we had in this country not a single establishment capable of producing even the steel ingots required for a 6-inch rifled gun, but had to send to Krupp, Armstrong or Whitworth, for such material. He demonstrated, as an expert, before the Military Committee of Congress, so clearly the capabilities and advantages of location of the Watertown arsenal, where he had been twice stationed, that Congress made the necessary appropriations, and the result is that we are now producing not only the grade of steel required, but are making heavy guns equal to the best of their class made in Europe.

The nation has suffered a loss in the death of this man of learning and ideas in his mid-career of usefulness and of a devotion to duty so great that he seemed intirely indifferent to his own temporal advantages.

In consideration of the eminent services of this officer and the situation in which his widow and young children have been left by his death, the committee have no hesitation in most earnestly recommending the passage of this bill.

The Pope Electric Clock.

The illustrations on this page show a new electric clock which has recently been put upon the market. It is the invention of Mr. Leon Pope, a gentleman who has had over 30 years' practical experience with such electricians as Wheatstone, Bain, Cully, Siemens, Henley, Breque and Gaiffe. The Pope clock is free from the objections to many electric time companies' clocks, simply because it is an independent clock. The perplexing difficulties attendant upon a wire circuit system of time distribution are unknown to this clock. Another feature is that it is sold outright. Various styles of cases are made, but the same mechanism is supplied with each.

The pendulum, the cause of its absolute accuracy, differs fundamentally from all other pendulums in that it is a vibrating elastic plate or reed; and, as is well known, has two properties that give it pre-eminence as a measurer of time. First, such a vibrating plate is isochronous, *i. e.*, its rate is the

FIG. 1.—THE POPE ELECTRIC CLOCK.

same, whether it swings through a small distance or a large one (the want of this property is the chief cause of an ordinary pendulum clock changing its rate); second, such a plate describes a cycloidal arc, which every mathematician well knows is the only path that can and does give absolutely uniform time.

When it is stated that this reed pendulum is made to drive the clock train directly, it will at once be evident why this clock should keep perfect time. The very nature of the pendulum necessitates absolute regularity, and as the train is driven by the pendulum, it follows that the train must have the same absolute regularity.

By driving the clock train direct from the pendulum, two-thirds of the ordinary mechanism of a clock, with its friction and liability to get out of repair, is entirely dispensed with, and there are no cords or springs to break. The electrical power is local, consisting of a single cell of battery, sufficient to run the clock for several months.

By an ingenious mechanism, constructed on the principle of the detached lever, absolute intervals of time are marked, no matter whether the amplitude of the pendulum be more or less.

Maussier Aluminum Process.

This process is coming to the front, says a foreign exchange, for it is announced that one of the largest French engineering firms has undertaken to work it on an extensive scale. The process, he continues, comprises three distinct periods and kinds of operations—the desilification, the reduction and the liquidation. The desilification is effected by means of fluorine, or fluoride of calcium, at a high temperature in the presence of carbon. Lime, or the carbonates of potassium, or sodium, may be added to facilitate the decomposition of the silicate. The reduction or expulsion of the oxygen is obtained by means of iron and manganese raised to incandescence in the presence of carbon. The liquidation, the object of which is to separate the aluminum from the iron and the manganese, is effected by dropping the molten mass into carbon ingot moulds. These moulds are made of wood charcoal. The aluminum so obtained is nearly pure.

Easily Seen.

Since the adoption of electric lights in St. Louis and the removal of the lamps which bore the street names, there has arisen the same vexation as in other cities. The street inspector conceived the idea of marking the streets by the means of "shadow signs." The plan is to paint the name of the streets

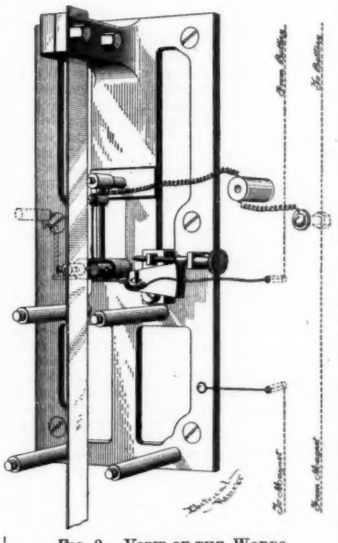


FIG. 2.—VIEW OF THE WORKS.

on the electric light globes and to throw "shadow letters" upon the ground. It was tried, and worked with unqualified success. The words "Market street" were painted in a reversed way upon the globe, in letters about three-quarters of an inch in length. The words cast a shadow of five feet upon the ground. The name could be read 50 feet away, and was, without doubt, the best street sign ever seen in St. Louis.

Young Ladies to Work on Sunday.

Mr. E. W. Carritt, the general superintendent of the Metropolitan Telephone Company, said that the reported dissatisfaction of the women operators concerning the new order of the company for them to work Sundays, was wholly without foundation.

"The situation is simply this," said Mr. Carritt. "We have ordered the girls to work Sundays because we found it necessary to improve the service on that day. Not only will each girl working Sunday receive extra pay for that work, but compensation in time will also be given her by allowing her to leave work on the Saturday preceding the Sunday on which she is to work. Another point to be considered is that the Sunday work will not demand the services of all the girls, but only of a few. In some districts a girl will not have to work Sunday more than once in 10 or 11 weeks. In others they may have to work once in five or six Sundays. The average of the whole force will not be greater than one Sunday out of seven or eight weeks. As to the matter of making the girls work more than 60 hours a week, I am prepared to say that under no circumstances would the company do that, whether or not there was a law bearing on the subject. The girls understand the case, and there is and has been no dissatisfaction among them."

TELEGRAPHIC

.... The census will show that in the last ten years, typewriters and telegraphers have increased faster than any other class in New York.

.... Test office receipts of the Western Union Telegraph Company for the first week in June were $260,000, against $250,000 last year, which was a conspicuous one, for the reason that the company had a rush of business from all parts of the Union, on account of the Johnstown floods.

.... The Kentucky Court of Appeals has decided that a telegraph company is liable for damages both to feelings and financial interests by failure to use all due diligence to deliver a telegram. The case was Chapman against the Western Union, in which the telegraph company failed to deliver a message to Chapman, notifying him of the approaching death of his father.

.... The cable steamer "Westmeath," which is to lay the cable between Halifax and Bermuda, has arrived in port. She left Bermuda about two weeks ago, and after laying about 10 miles of heavy cable, to connect the offices at Hamilton with the cable hut at Castle Harbor, took soundings till she got off Halifax. The bottom was found to be very smooth and soft. The shore end will be landed near the direct United States cable. The steamer will commence laying in about a week and will complete her work in a short time after.

.... The Canadian Pacific Telegraph Company, with the assistance of their commercial cable connection, performed something in telegraphy, recently, hitherto unknown, says the St. John, N. B. *Daily Sun*, of June 5. The result of the famous English Derby race was received in the city exactly one and a half minutes after the race, and in two minutes, bulletins were posted in the daily newspaper offices, the Board of Trade rooms, Royal, Victoria and Dufferin hotels. This remarkably quick transmission shows that the Commercial Cable Company and Canadian Pacific Telegraph Company are fully alive to the requirements of the public. The Direct Cable Company, landing at Halifax, was four minutes behind the Canadian Pacific Company in furnishing the news.

Cleaning Files by Electricity.

An improved means for cleaning files, which is claimed to restore them to the condition of new files, is described as follows: After being cleaned and wetted, the files are dipped between two carbons into acidified water and the circuit of an electric current is established between the carbons and the file by means of a piece of metal serving as a support to the file, by which the latter is suspended. The water is then decomposed by the current, the oxygen acting upon the cuttings of the file, while the hydrogen bubbles settle in the teeth and protect them against the action of the acidified water. After immersion for a few minutes the file is withdrawn and brushed in clear water to remove the oxide of iron, and then replaced in the bath. When the cuttings are entirely cleared, the file should be immersed in an alkaline bath to remove all traces of the acid, then dried and brushed.

New Welding Plants.

The Thomson Electric Welding Company, of Boston, has just made contracts with the Roeblings, of Trenton, N. J., to supply seven welding machines in addition to those already there. Also with the United States government to install welding plants at the navy yards at New York and Norfolk, Va., and with the Pennsylvania Railroad Company for a large welding plant at the company's works in West Philadelphia.

Railway Telegraph Superintendents.

A VERY SUCCESSFUL MEETING AT NIAGARA FALLS.

The ninth annual meeting of this association was held at Niagara Falls, N. Y., on June 18th and 19th. The following members were present: C. A. Darlton, president, Washington, D. C.; P. W. Drew, secretary, Chicago; C. W. Hammond, St. Louis, Mo.; C. Selden, Baltimore, Md.; A. R. Swift, Chicago, Ill., G. L. Lang, Boston, Mass.; G. C. Kinsman, Decatur, Ill.; G. T. Williams, Cleveland, O.; M. B. Leonard, Richmond, Va.; R. Stewart, Elizabeth, N. J.; A. Ramseur, Atlanta, Ga.; I. T. Dyer, St. Joseph, Mo.; U. J. Fry, Milwaukee, Wis.; H. C. Reed, Milwaukee, Wis.; J. B. Stewart, Wehawken, N. J.; M. Magiff, St. Albans, Vt.; W. J. Holmes, New York, N. Y.; W. W. Nichols, Chicago, Ill.; W. F. Taylor, Altoona, Pa.; O. C. Greene, St. Paul, Minn.; W. E. Lewis, Long Island City, N. Y.; H. C. Sprague, Kansas City, Mo.; G. M. Dugan, Jackson, Tenn.; L. B. Foley, New York, N. Y.; C. S. Jones, Chicago, Ill.; A. R. Singafelt, Topeka, Kan.; E. A. Smith, Boston, Mass.; S. K. Bullard, Sedalia, Mo.; T. W. Stacey, Marshall, Tex.

The first session of the meeting was held Wednesday, at 10.35 A.M. After the reading of the annual report, the following new members were elected: J. C. Ford, St. Paul, Minn.; W. J. Stonebromer, Two Harbors, Minn.; H. D. Milton, Texarkana, Texas; J. V. Goode, Kansas City, Mo.; P. H. Hough, La Crosse, Wis.; G. N. Gish, Marshallton, Iowa; H. B. Briggs, Redwing, Minn.; T. W. Parks, Tyler, Texas; J. N. Miller, Dallas, Texas; W. D. Hendrickson, Long Branch, N. J.; B. R. Pollock (the World's Champion sender), Hartford, Conn., and L. Horton, Jr., St. Paul, Minn.

The following officers were elected for the ensuing year:

President, George T. Williams, of Cleveland.

Vice-President, George M. Dugan.

Secretary and Treasurer, P. W. Drew, of Chicago, re-elected.

M. B. Leonard, Charles Selden and G. C. Kinsman, were appointed a committee on time and place of next meeting.

It was decided to devote the afternoon to a tour along the American and Canadian shores of the Falls and Rapids, and substitute an evening session for that usually held in the afternoon.

The first paper of the evening, of which the following is an abstract, was read by Robert Stewart, superintendent of the Central Railroad of New Jersey, on the "History and Development of the Block System." Mr. Stewart was the first railroad telegraph superintendent to introduce this system of signaling in America. He was at the time connected with the Camden and Amboy Railroad, over which nearly all the Eastern troops passed during the war. A rear collision, which occurred at Bristol, Pa., in the summer of 1863, causing the death of a large number of soldiers and the fireman of the engine, led to the investigation of an English block system, at the request of Ashbel Welch, then president of the company, and Mr. Stewart was instructed to experiment with and put in use a signal, by which trains could be notified, without being stopped, that the track to the next point was clear. After some experimenting, he placed in operation seven block stations upon the 25 miles of road, between Trenton and Kensington, using the banner signal, in conjunction with the regular telegraph offices. There were two fixed glasses, the upper two white, and the lower red, with two independent lamps, one for East and one for West bound trains, which were operated by hand, with a rope attachment. This arrangement proved defective, and a single lamp, with a movable red flannel shield, was substituted. A record of the trains was kept on a board with pegs. The telegraph operators used the regular Morse system for notifying adjacent stations that trains were in or out of the block. The experiment proved so successful, that it was extended from Trenton to New Brunswick, covering 26 additional miles of road in 1864. Shortly after, upon the formation by consolidation, of the united railroads of New Jersey, the system was extended to Jersey City, making it complete from Philadelphia to Jersey City, excepting between the cities of Newark and Jersey City. In 1870, a connecting road from Frankford Junction to Mantua was equipped, making a total distance of 90 miles. From the establishment of this system up to the date when road was leased by the Pennsylvania Railroad, no rear collisions of any kind occurred, which he attributed to the fact that only the "positive" block was used, in distinction from the "permissive" block, afterwards introduced by the Pennsylvania Railroad, by which two trains were permitted upon a block at the same time, by observing caution. In 1873, the Pennsylvania Railroad began the introduction of the system to a limited extent on the Pittsburgh division of the main line. Its extension was very slow until the winter of 1875-6, when it was rapidly extended over the entire main line. Its use was stimulated by the approaching Centennial Exhibition, and, in spite of the enormous increase of traffic, the protection was so complete that no accident occurred which could be attributed to its failure. As originally introduced, the blocks were of considerable length, depending upon local conditions; but on the main line the distance varied from six to ten miles. The signal now used is the standard semaphore. The Pennsylvania Railroad has now a continuous block system from Jersey City to Pittsburgh, and from Philadelphia to Washington, the most extensive in this country, also on the northern central division. The officers pronounce it a great success, and an absolute necessity to the road. On the Central Railroad of New Jersey, the electric pneumatic block signal system of the Union Switch and Signal Company was put into operation in April, 1890, between Jersey City and the Newark Bay draw, a distance of eight miles. The blocks, ranging from 1,000 to 1,800 feet, are operated on four tracks. At the commencement of each block, signal posts are erected, one for each track, carrying two semaphores. When the upper semaphore is at right angles, it indicates that a train is on the next block. When it projects in this way, the lower one is also set at "danger" or "caution." As the train leaves the block thus protected, the upper signal falls, but the lower remains at caution until the next block is passed and the train is two blocks distant. These semaphores are operated by pneumatic pressure, controlled by electricity. Those on one block are insulated from the preceding and following blocks. At the end of the block first touched by a train, the right and left hand rails are connected by a wire hung in circuit two cells of gravity battery. At the other end of the block the same rails are connected through an ordinary relay. When no train is on the block, a current passes through this rail circuit holding the armature of the relay in contact, forming a circuit for the local battery. When a train enters upon the track its wheels and axles short circuit the battery, releasing the armature of the relay and breaking the local circuit, having a battery of eight cells. The local battery operating the semaphore magnet, when its circuit is closed, forces open a valve which admits compressed air into the semaphore cylinder and the piston is driven down forcing the semaphore into the "safety" position. With the entry of a train upon a block the relay being thrown out of action the local circuit is opened and the semaphore is drawn by a weight into "danger" position. Where the "home" and "distant" signals are both operated under these conditions, the arrangement of circuits is more complicated. The supply of compressed air is furnished by a plant of compressors communicating by pipes with a series of reservoirs placed along the line at the foot of the signal poles, and pipes are connected from there to the semaphore signals. The ordinary ties are found to afford sufficient insulation for the rails, but the fish-plate joints not being ample conductivity is reenforced by iron wire connections. Between the blocks the rail ends are insulated.

Mr. Stewart then described the various systems of block signals which had been actually introduced, beginning with the Hall system, which was first used on the Eastern railroads, in 1871, and has since been greatly improved. Other systems referred to were the Sykes, used on the New York, New Haven and Hartford, and the Black mechanical signal, the latter being used on the elevated railroads in New York and Brooklyn. Another form of automatic signals used in this country is known as the Union Switch and Signal Company's clock system, which has been introduced on the Boston and Albany, Old Colony, New York, Providence and Boston, and a number of other roads. In 1882, it was adopted on the New York and New England Railroads. The Chicago, Milwaukee and St. Paul Railway Company has a block system in operation on 146 miles of their Chicago and Council Bluffs division, using double arm semaphore placed in a position to be seen from both directions. It is operated by hand in connection with an ordinary Morse telegraph. The cable electric signal is being experimented with on the Staten Island Rapid Transit road. The Chesapeake and Ohio Railroad use a system similar to that of the Pennsylvania Railroad, covering all tunnels and trains going down both sides of the Alleghany mountains, using the Hudson semaphore signal.

The Chicago, Burlington & Quincy have practically three different systems in use, all non-automatic, the difference being mainly in the manner of connection between offices. The main line from Chicago to Pacific Junction, 482 miles, is now operated under what may be called the "permissive" block. The New York Central Railroad has begun the introduction of a pneumatic-electric system on that part of its track between Woodlawn Junction and the Harlem river, the same as that used on the Central Railroad of New Jersey. The New York Central is also equipping 15 miles of track near Poughkeepsie with the Hall system. The New York, Lake Erie and Western uses a block system on 232 miles. Other railroads using various block systems, are the Boston and Maine, Philadelphia, Wilmington and Baltimore, the Missouri Pacific, the Canadian Pacific and the Lake Shore Railroads.

A signaling system operating a visible and audible signal in the cable has recently been introduced by the Desart Electric Company, of Columbus, Ohio. It is used on the suburban road north of the Harlem river. Another electric block system is owned by the Pennsylvania Steel Company.

In closing his explanative paper, Mr. Stewart said that the system of blocking trains has and could be improved, and that the time is not far distant when upon all the main trunk lines of the country the business will have grown to such an extent that in order to move all trains at a higher rate of speed, especially freights, it will be necessary to locate signal towers at such distances as will permit the use of the "absolute" block to govern all their movements. Speed and safety were so closely allied in the successful operation of railroads that whatever tends to their accomplishment, the progress of the times would not permit to be ignored. If a simple and inexpensive automatic system could be devised for operation between the main block stations, a long step in advance would be taken. "Permissive" signaling might then be used with absolute safety at the main stations, as the auxiliary would act as an "absolute" intermediate block.

Mr. Charles Selden read a paper upon the increased adhesion between the wheels of a locomotive and the track, caused by the passage of electricity, based upon the experiments and patents of Elias E. Ries, of which the following is an abstract: From competent authorities on motive power, it has been determined that a locomotive, having a weight of 100,000 pounds, has a tractive power upon the rail, when in best condition, of but 25,000 pounds. And when the rail, by reason of the weather, is in a bad condition, the tractive power amounts to only about what an engine of 15,000 pounds weight should have. In other words, on good rail, by non-adhesion, the locomotive gives but 25 per cent., and on bad rail but 18 per cent., of the power which, theoretically, should be had from it.

Efforts were made some 15 years ago, by an Englishman named Waderman, to overcome the non-adhesion, by winding the spokes of the driving wheels with wire, thus making a magnet of the wheel, with the view of, by magnetism, attracting the wheel to the rail, thus increasing the friction, and, thereby, the adhesion to the rail on the part of the locomotive. Having but a primary battery, it is plain to be seen that the results were so slight as not to be appreciable. Another objection, even had the dynamo been used, was that in order to secure sufficient magnetism to be of benefit upon such an immense machine as a locomotive, the magnets would have to be very large, and the winding upon the spokes of the drivers would have necessitated a change in the construction of the engine, so that as the bobbin was being revolved by the wheels there would be room to clear the firebox on the inside and the side-rods of the locomotive on the outside. This, of course, would render necessary a longer crank pin for the bars, and being longer, it must necessarily be stouter in order to stand the increased leverage, so that a device of this character for the locomotive engine would not be economical, and would necessitate the reconstruction of all locomotives using it. This inventor filed patents in this country and several others followed in his footsteps, but nothing practical has yet been evolved from that method.

Recently, Mr. Elias E. Ries, an American inventor, secured letters patent upon his method of increasing the adhesion of the locomotive to the rail, by the use of electricity, and he took a wide departure from the path pursued by former inventors. Mr. Ries proceeded upon the hypothesis, that an electric current of large volume, if properly employed, could be used to weld metals. Acting upon this theory, he proposes to arrange, upon a locomotive, a dynamo of sufficient power to be run by a small auxiliary engine and to pass the current from the dynamo to the driving wheel of the engine, along the rail to the next driving wheel, through its axle and the other wheel, to the other rail and back to the first driver, thence to the dynamo, thus making a local circuit, so to speak, which would travel with the locomotive, passing a current through the drivers and along the rail, as indicated, and for this purpose, by a very simple method, he insulates one pair of the driving wheels. By this means the inventor proposes to cause an incipient weld between the driving wheels and the rails. I say incipient because the wheels, being in motion, the weld, if any, is being made and broken by the revolution of the wheels, therefore, a perfect weld is not obtained; nor, of course, would it be desirable, except for brake purposes, as in descending a grade, for instance.

If the theory advanced by Mr. Ries can be made a success, practically, it means a great many things to the railroad world. If by means of this invention the tractive power of a locomotive is increased, say, even 25 per cent., it means ten additional cars on a 40-car train. It means a large gain in the hauling capacity on high grade railroads. It means increased speed for passenger trains. It means a saving, indirectly, of fuel. It means the employment of lighter locomotives to do the same amount of work as the heavier ones, thus being easier on the road-bed and bridges. It means the mounting of grades that would not be considered as possible at the present time. All this, provided, that in practice, on a locomotive, the theories advanced shall hold good. * * * Another feature of this invention is that it is not necessary to keep the current flowing all the time, unless you need it, but when you stop the train and want to start it, your locomotive, at that time not being in motion, a more perfect weld is obtained, thus enabling you to start at once, without slipping, and after you have gotton your train under headway, your current, if desired, may be switched off. So much for the pulling power, and so much for the motor.

The statements made by Mr. Selden were questioned by Mr. Nichols, and a model motor and track were introduced to prove the assertions claimed by the inventor. The experiments made were entirely satisfactory and convincing to the most skeptical—the only question being as to the practicability and economy of the application on a large scale.

W. F. Taylor followed with a paper on "Lighting at Wrecks." After referring to the importance of powerful artificial lights to facilitate the clearing away of wrecks at night, Mr. Taylor gave a description of the electric light car used upon the Pennsylvania Railroad.

The car itself was an ordinary box car, having an end door with a small extended platform and windows. A 15 horse-power boiler is at one end, surrounded with water tanks of 800 gallons capacity. Near this is a coal box holding two days' supply of fuel. At the opposite end of the car is a 15 horse-power Westinghouse engine, making 300 revolutions per minute. Near the center of the car is a 10-light Weston dynamo making 1,000 revolutions per minute. Suitable receptacles are provided for tools, lamps, etc. On one side of the car two reels of wire are permanently fastened, one of which contains a wire that is run out as a feed wire, the other being connected to the last lamp of the circuit and is used as a return wire. The lead wires are connected with a brush which connects with the axles of these reels, thus giving a path for the current. Upon top of the car are carried tripods and tools for hanging the lamps. The car is manned by a crew of one engineer and four linemen. In starting for a wreck, the regular crew is always preferred, as they are thoroughly drilled. Arriving upon the grounds, the first thing is to locate the car; then determine the number and location of the lamps. Then a man is started out with the end of wire from the small reel, followed by another carrying pole, spike and hammer, or tripod, as required; then the third man with the lamps and a short section of wire, continuing till the last lamp is reached, when the wire on the larger reel is run out and connected with the last lamp, thus completing the circuit. The lamps are swung from the most available points, portable poles being used, if necessary. These are usually made of 4"x4" hickory, 18 feet long, with the lamp. At the bottom a piece of 1" gas pipe is clamped to the pole. To erect the pole a steel bar is driven into the ground, and the pole is then lifted up so that the gas pipe will go over the steel bar. In the bracket at the top of the pole is a pulley through which a rope passes and thus draws up the lamps. The pole is more easily handled than a tripod. The time occupied in starting up the lights is shown in the following instances: Wreck No. 1, seven lamps, three-eighths mile of wire, started in one hour; No. 3, seven lamps, one-half mile of wire, 1¼ hours; No. 4, six lamps, one-half mile of wire, 35 minutes. The cost of equipping a car ready for service was about $2,500. In operation it costs about $1 per lamp per hour, but even if it cost $5 per hour it would be worth it.

Papers were read by Mr. B. Leonard, on "Electric Lighting in Railway Service;" by Geo. C. Kinsman, on "Train Despatching, Its Uses and Abuses," and "Correct Time, How Shall We Maintain It?" by Prof. H. S. Pritchett, of Washington University, St. Louis. The meeting adjourned Thursday evening, to meet next year at Cincinnati.

There was a larger number of exhibitions than usual, among them being the Hall Signal Company, Edison Phonoplex System, Edison-Lalande Battery, Electric Secret Service Company, Pennsylvania Steel Company, Molecular Telephone Company, P. B. Delany, O'Neill Crossing Signal, and the Desart Electric Company. W. T. Brown, president and general manager, the Brown Electric Protective Company. Several ladies attended the meetings of the association.

Meeting of the Board of Electrical Control.

The Board of Electrical Control held a meeting in the Mayor's office last week.

The board spent most of its time in wrestling with the electric poles and wires.

Commissioner Gilroy read a list of streets which had been paved under the million dollar appropriation. In some of these the subway had been built; in others it had not. "I will not give a permit in a single one of the streets which have been paved," said he. "I do not propose to have that pavement spoiled by excavations for subways."

On motion of the Mayor, all permits granted by the board for such streets were revoked.

Then the Mayor declared that he should at once cut down the poles and wires in those streets. "We have given the electric light companies six months' notice, and that is plenty. They have played with us long enough, and now I shall exercise the powers which are vested in me."

Secretary Brown, of the United Light and Power Company, protested that the fault lay with the construction company and not with them.

Police Commissioner Voorhis made a strong fight to get a separate conduit laid for the police wires. For some reason he did not wish to sleep double with the fire alarm wires, and he persisted and insisted that the duct was too small. The board refused to grant his request.

The Fort Wayne Electric Company.

The Fort Wayne Electric Company issues the following circular to its stockholders, of date Fort Wayne, June 16, 1890:

"Pursuant to the authority given by the stockholders' vote adopted at the recent annual meeting of this company, its capital stock has been increased by $1,000,000, divided into shares of $25 each. By this increase the company acquires valuable patents, licenses and contracts, besides $450,000 in cash for working capital. The company is thereby enabled to make still more complete and effective its present system of arc and incandescent lighting, and to prosecute its business more extensively and successfully than ever before.

"By the terms of the issue as fixed by the directors pursuant to said vote of the stock holders, the new shares, fully paid by the cash, patents and property above referred to, are required to be offered for sale to the stockholders of the company in proportion to their several and respective holdings in the present issued capital stock.

"Accordingly, arrangements have been made whereby each stockholder of record at the close of June 20, 1890, will have the right to purchase, within the time specified below, one share of the new stock for every three shares of the old that shall then be standing in his name on the books of the company, the price at which the stock may be so purchased being $12.50 per share, in cash.

"Agreements in writing for the purchase of the new shares will be received at the office of the International Trust Company, No. 45 Milk street, Boston, Mass., until and including Wednesday, June 25, 1890, but not afterward, and the payments must be made to said Trust Company, in cash, on or before Saturday, June 28, 1890, on which day the stock certificates will be ready for delivery. All agreements to buy, though seasonably made and filed, may be declared void by said Trust Company, unless the required cash payment shall be made to it on or before said June 28th."

The present capital stock of the Fort Wayne Company is $3,000,000, and a dividend of three per cent. was recently paid.

The City of Allegheny, Pa., and Its Light.

It is thought that by July 1 Allegheny City will be lighted from one end to the other by electricity, as all the towers have been erected and all that remains to be done is to put a few finishing touches on the Braddock street power house. There are also 25 mast arms, with 100 intersecting lights, scattered throughout the different parts of the city, where they will do the most good. The city hall, engine houses and other public buildings, are supplied with incandescent lights, 2,130 in number. The total number of towers is 53, total number of lights, 216. The cost of the entire system was $151,158. Of this amount, $32,600 was spent for the building site. The power house is a handsome brick structure with stone trimmings.

Electric Lighting in Baltimore.

Mayor Davidson has definitely determined that he will not sign the electric light ordinance passed by the City Council recently, says the Baltimore *News*, but will let the city be furnished with its electric light as at present until the Council again has an opportunity to consider the matter.

"If the company represented by Mr. J. Frank Morrison means business and will spend the money—$500,000, or so much thereof as may be necessary to establish a first-class plant here—I am," said the Mayor, "in favor of letting them have a chance to bid for the work. But if they do not give practical evidence that they are in earnest, then I do not think a bid from them ought to be considered. I would, however, if the matter could be entirely divorced from politics, greatly prefer that the city should own its own electric plant, and light the entire city with electricity. If the city would do this it could do away with the use of gas and the employment of lamp lighters, and a saving of $100,000 a year could be effected."

The city has at this time in its service 607 electric lights, at 40 cents per night each. This is exclusive of Druid Hill Park, where there are 16 lights at 35 cents per night and 19 incandescent lights, for which $55 each per year is paid. The total cost per year to the city is $91,438. Under the bid of Mr. Morrison, the saving to the city, it is estimated, would amount to nearly $30,000.

Electric Lighting in New Brunswick.

A recently organized St. John corporation is the Calkin Electric Light Company, with a capital of $150,000. The projectors of the company have just contracted with the Fort Wayne Electric Company for 4,000 incandescent lights, of the Slattery induction system, and 240 arc lights, of the Wood system. The plant will be installed at once. Four 150 horse-power compound condensing engines will be used to furnish the power. Messrs. Kingsley & McLane have secured the order for the boilers, which will be built by Messrs. McLaughlin Bros., of St. John.

The contract and all negotiations have been carried to a successful termination by Mr. W. J. Morrison, representing the Fort Wayne Company, and Mr. George E. Calkins, of St. John. These gentlemen have left for Montreal, Toronto, Hamilton and Fort Wayne, Ind., to purchase all necessary supplies required in the construction of the plant. When completed, this plant and station will be the finest in the Dominion.

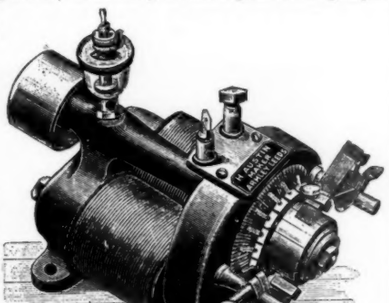
An Electric Flaw Detector.

We mentioned Dr. Cheval's electric acoumeter in this column last week—that is, for the detection of deafness and sham deafness. Capt. du Place has devised what he calls the schiseophone, a modification of Prof. Hughes' sonometer, but which may be useful in the shops in detecting concealed flaws in, say, crank-axles of locomotives and propeller-shafts of steam vessels, especially as experiments made in the Ermont shops of the Northern Railway of France are reported successful. The instrument comprises a striker and an audiometer. A steel rod is moved to and fro in front of a microphone, periodically striking the metal bar under examination. Two coils, one movable and connected to the microphone, the other fixed and connected to two telephones, are arranged on a graduated rod. Having placed the movable coil so that the telephones are silent so long as the hammer is striking a solid portion of the metal, the hammer is moved along the bar, and should there exist a flaw in it, the increased noise given out causes more powerful currents to flow in the microphone circuit, with the result that the telephones are no longer silent. At the time of the Penistone accident, it was suggested in these pages, says the *English Mechanic*, that Prof. Hughes' induction balance might possibly be utilized for detecting concealed flaws, or, if not actually for "detecting," for raising suspicions as to the soundness of a crank-axle intended to be fitted to a locomotive.

An "Infant" Dynamo.

Mr. H. Austin, of England, is introducing a machine which he hopes may meet the demand for small dynamos, having equal merits with the larger ones made by the leading makers, as far as regards good output for power absorbed. He commences, says the London *Electrical Review*, where other makers leave off, namely, at one unit, the range of sizes being 1,000, 700, 400, 200, 100 and 50 watts. These are all made alike in every detail, differing only in size.

The armature core is made up of thin best Swedish charcoal iron rings (No. 18 B. W. G.), accurately turned, both inside and outside, by special machinery. The sharp corners left on in turning are all carefully ground off each separate ring, which is then coated on both sides by a varnish made up of very thin shellac varnish, in which is mixed some fine Paris plaster. The core is then built up to the required depth, the separate pairs of rings, while under pressure, being carefully tested for insulation, and mounted on a strong spider of hard brass. The core is then well insulated and wound in the Gramme fashion. The commutator is made up of segments of brass of a special quality all carefully insulated (with asbestos or mica), and has a good wearing depth.



THE "INFANT" DYNAMO.

The field magnet cores are made of best Swedish iron, carefully annealed, and are screwed into the pole pieces—the pitch of thread being almost microscopical—a method which gives a very good contact between the two surfaces. The yokes are very massive, having a sectional area three times that of the cores. The bearings are of very hard phosphor bronze, and are of good length. Each dynamo is fitted with a sight-feed lubricator. The used oil finds its way by suitable passages into the oil dish under the yoke of the magnets. There is only one lubricator to each dynamo, the oil entering between the two brushes and working outwards, thus keeping the bearings perfectly clean.

The armature can be taken out for examination in a few moments, it only being necessary to lift the brushes off and loosen the nut off at pulley end of spindle. The dynamos are fitted with rockers to brushes in special cases, but in most cases this is unnecessary, the required lead being given by a suitable arrangement on brush holders, which, when fixed, are not so easily tampered with as rockers. There are no loose wires dangling about from brush holders to terminals, and every effort is made to make the machine as simple and effective as possible, the workmanship also being of the best class.

Electric Light at Sea.

An interesting account reaches us of the narrow escape of the steamer "Beacon Light," on her voyage across the Atlantic, last month, when she collided with an iceberg of great magnitude. The ship was provided with a powerful search-light with reflectors, and during a heavy fog, about midnight, an immense iceberg was seen "towering above the vessel not 75 feet away. Orders were given to alter the helm and reverse the engines, but not altogether in time to clear the berg, which was struck by the starboard bow of the steamer. A large quantity of ice was dislodged and the ship was considerably damaged, but brought safely into port." It is not too much to say that their safety was due primarily to the electric light, which enabled them to see the iceberg earlier than would have been the case in ordinary circumstances.—*London Electrical Review.*

—— The electric light committee of the city council of Marietta, O., has been ordered to extend the plant and purchase additional dynamos, etc.

ELECTRIC LIGHT NEWS

—— The city of Monroe, Ohio, is asking for bids for street lighting, the bids to be opened June 30.

—— J. F. Landray, formerly connected with the California Electric Works, was drowned at San Francisco, recently.

—— Hamburg, Pa., is negotiating for the electric light. Mr. L. E. Snow, of the Thomson-Houston Company, is on deck.

—— Kenton, Ohio, is pleased with its new electric light plant. The city has improved in many respects with the advent of electricity.

—— The Hamilton Electric Light Company, of Hamilton, Ohio, has contracted for a 500-light Westinghouse alternating current incandescent dynamo.

—— The Troy Electric Light Company is to be dissolved. The assets of the company are given at $165,666.77, inclusive of $32,000 in real estate, $31,920 in machinery and tools, and $79,980 in electric dynamos, wires and other apparatus. The liabilities are given at $346,284.38.

—— Last week the Fort Wayne Electric Company received a telegram from the Manhattan Company, of New York, that lightning had struck their plant the night before and destroyed 21,000 incandescent lamps. It will tax the capacity of the Fort Wayne works one month to supply the break.

—— At Vinton, Iowa, is one of the latest central station plants to be furnished with the Westinghouse alternate current apparatus. This plant will start with a capacity of 500 sixteen candle-power lights. Hiawatha, Kan., is also to have an electric light plant of 500 lights. The Westinghouse system of alternate current incandescent lighting will be operated in the plant.

—— The demand of the electrical industry for platinum is making that already precious metal more precious. The price, it is announced, has already risen 100 per cent. in value within the last year, and it is expected to continue in its upward course, never, perhaps, to be cheaper. It would be a small fortune to the chemist who could provide a substitute.—*London Electrician.*

—— The Westinghouse Electric Company has received a cablegram stating that they had been awarded the contract for a central station plant at Barnsly, England, having a capacity of 6,000 incandescent lamps and 100 arc lights of the new pattern using the flat carbon. There was very sharp competition among the various companies, but the Westinghouse system was successful.

—— Prof. John P. Barrett, the Chicago city electrician, has, by making connections with the City Hall chimney, caused a draught from the city conduits that relieves them of all gases, and prevents the manhole explosions that have been so frequent of late. The Commissioner of Public Works recommends this plan to all underground companies. Here's a pointer for New York.

—— The rapidly increasing demand for incandescent light by meter in St. Louis has made it necessary for the Missouri Electric Light and Power Company to extend their generating capacity at the station, and they are now preparing for the addition of boilers, engines and dynamos sufficient for 6,000 more lights, which will give them a capacity of 42,000 lamps. This, it is estimated, will provide for the demands of the coming Winter season.

—— The electric light has evidently found favor in Washington State. A company which started in the town of Tacoma less than a year ago, with a 750-light plant, has already been obliged to make arrangements for an increase of its capacity. A contract was awarded the Westinghouse Electric Company for alternating current apparatus of 1,500 lights capacity. The same company has received the contract for the installation of an alternating current dynamo of 750 lights in Saginaw, Mich., where an electric light company was recently organized.

A Telephone Romance.

When the history of the telephone is written, it will be enlivened by many romantic incidents. A young gentleman in a near city is in a condition to furnish one of these. He is engaged in an establishment where the telephone is considerably used, and some time ago he became impressed with the conversation of a person who informed him by the articulate wire that she was engaged as a clerk in a business house with which he had frequent occasion to communicate. The head of this house may be called Mr. Smith, chiefly because that isn't his name. The young man became thoroughly enamored of the sweet voice, whose tones almost daily came to him, and after a time he begged and obtained an appointment for an interview. Then he put on his purple and fine linen and went down to the store from which the agreeable communications had come. A small boy met him as he went in.

"Is Mr. Smith in?" asked the young man—not because he wanted to see Mr. Smith, but because he thought it best not to be too abrupt in his inquiries.

"No," said the small boy, "but he'll be in in a minute."

The accents of the small boy startled the young man; they were the same that had been almost daily wafted to him along the wire. He immediately said that he would call again to see Mr. Smith, and withdrew in as good order as possible. But he felt that he had had a narrow escape.

Great Telegraph Feat Thirty Years Ago.

The greatest feat in telegraphing of which we have any knowledge was accomplished on Tuesday, in the transmission of the President's message to this city. Two wires were used, one a through and the other a way wire. Of the eight columns and a half which the message made in the Washington *Constitution*, five and a half columns were passed over the through wire, without a break, in six hours. This was sent by J. H. Bunnell (age 17 years), of the Pittsburgh office, and received by L. C. Weir, of the Cincinnati office.

The first column was transmitted in 55 minutes, and the second column in 48 minutes. One column contains as follows:

Lines.....	176
Words.....	1,584
Letters.....12,672	

It requires an average of three strokes of the key to a letter. There were, therefore, 37,986 strokes in 48 minutes, or 790.66 strokes to the minute. Mr. Weir, the receiving operator, took the message by *sound*, and, using a manifold writer, made five copies from the instrument. From the manuscript thus furnished, the message, as it appeared yesterday, was put in type. In seven hours from the time it was made public in Washington, the whole document was in type in our office. The expeditious manner in which this business was performed, and the accuracy with which the message was transmitted, the feat being without a parallel in the history of telegraphing, place the Union Company in the front rank of the telegraph companies of the world.

To show the perfection to which this wonderful system has been brought, and the improvements that have been made within a few years, we will mention the fact that in 1845, 48 hours were consumed in telegraphing the message of President Polk to the press of this city, and then the errors were so numerous that some of the papers republished the document when it came to hand by mail.—*Cincinnati, O., Gazette, December* 6, 1860.

[NOTE.—The figures above given are partially incorrect. The calculations made at the time at the Cincinnati office showed that the time made was nearly 39 words per minute for two hours' continuous work. Evidently the 1,584 words is a misprint for 1,884, inasmuch as 12,672 letters would make over 2,000 words at six letters per word. Considering the fact that this work was done over a 360-mile circuit; that the five manifolded copies were almost "copper plate" in their clearness; that not a single "break" was made, and that the transmission was with one of the keys of 30 years ago, the lever of which would weigh as much as three of the modern Bunnell key levers, it becomes apparent that some of our first old-timers used to shake up things at a pretty lively rate, even way back in the sixties.]—*Cincinnati Commercial Gazette, June 14th*, 1890.

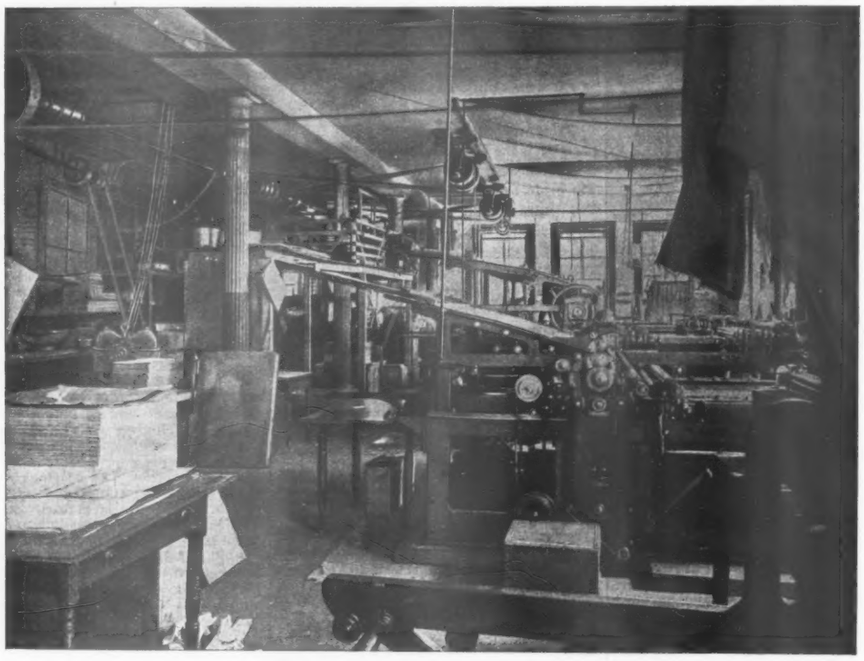
No Gas for Them.

A few days ago, the Westinghouse Electric Company received cable advice from England that it had been awarded the contract for furnishing a complete outfit of its alternate current apparatus for the establishment of a plant in Barnsley, Yorkshire. At a recent meeting of the town councils, that body decided to discontinue the use of gas as an illuminant of the town and substitute the modern method of lighting. The plant is to have a capacity of 6,000 sixteen candle-power incandescent lamps and 100 arc lights, of the new Westinghouse alternating current arc lighting system. The contract is said to have been obtained in the face of the keenest competition.

A New Electrical Clock.

W. W. Bradley, formerly of Waterbury, and now master mechanic of the Dueber Watch Case Company, of Canton, O., together with Electrician W. N. Parker, has invented an electrical, self-winding and synchronizing clock, which is described as follows in the *Sunday Herald* of that place:

"This clock has been so designed that it has but five wheels, and is run without springs. As a time-keeper, it is almost perfect, showing a variation of only four seconds in 55 days, which leaves it without a rival as a time-keeper. Sealed up, it will for two years register true time, the synchronizer rectifying the few seconds variation. Another admirable feature, and one that will count in service, is the automatic electrical switch lock, enabling the operator at the observatory, or wherever the master clock is located, to have a full control of all clocks connected by wire to the master clock. Attention from way-station operator is not required, and no meddling can affect the synchronizer. Clocks can be synchronized at any hour or half hour desired, from the observatory, and while the telegraph wires are doing full service. In obviating the defect in other appliances for a like purpose, the gentlemen deserve great credit in making it a practical device for home use, as well as railroad, city and factory time. The gentlemen have had large offers for their invention, but they will not determine on the disposal of it until all their patent applications have been allowed, in Europe as well as in this country."



ELECTRIC MOTOR IN A PRINTING OFFICE.

New Electric Meter.

Superintendent E. W. Rice, Jr., of the Thomson-Houston Company, has just patented a new method of measuring electric currents, which is novel and interesting. He does it by heating two expansible rods, bars or pieces of solid material, by the agency of an electric current flowing alternately in two circuits, automatically switching the current from one branch to another by the movement of the expansible bars as they alternately heat or cool, and registering or counting the number of movements of expansion and contraction.

Progress in Electricity.

A noted astronomer once said that it was a moral impossibility for one man to keep abreast of the science of astronomy. Indeed, said he, individuals find enough to do in devoting their attention to one subject like Mars, the Sun or the Moon, and following it for a lifetime. The same truth certainly applies to physics, and more particularly to the subject of electricity.

To say nothing about the purely scientific side of the question, no man can adequately study the advancement which is being made in the application of electricity to the mechanical arts. Not a week and hardly a day passes without some new invention to utilize this subtle power. Huge dynamos, new insulators, improved conductors, giant machinery and fairy-like contrivances, are some of the results which mechanical skill is constantly turning out in this fertile field of invention.

And, indeed, the marvelous adaptation of this new agent to the practical ends of life even transcends the development of the steam engine. Nor will it be strange if the lightning does not make a greater revolution in mechanics than the tea kettle did after that happy experiment of James Watt. Inventors are already feeling their way into the employment of electricity as a motive power on a large scale, and it would appear that the world is at the threshold of some daring experiment which shall eventually overturn existing ideas as to the limits of mechanical force.

At all events, the progress which is going on in harnessing electricity to the wants of man is immensely greater and more ambitious than that which marked the history of water power, and afterward that of the steam engine. Arguing, therefore, in a sort of ascending series there seems to be ground for extravagant expectations as to the outgrowth of inventions along this line. The multiplicity of them shows that the field is in no wise exhausted, and it is hardly probable that the largest and most far-reaching results have been reached as yet.—*Baltimore Herald.*

What Dr. Green Thinks the Government Should Do.

In a letter, opposing the establishment of a postal telegraph company, Dr. Norvin Green, president of the Western Union Company, says:

"What government under the sun has ever established a postal telegraph without first taking and paying for, a fair and full valuation, all existing telegraph properties, where there were any. Whatever the government does for the people it must do exclusively. If the telegraph be held as part and parcel of the postal service, then, like the remainder of the postal service, the government should do it all. If the government must have a telegraph as part of the postal service, why not take existing properties rather than create a new company, backed by the power and support of the government, to damage and destroy the old ones."

The Telephone at the Tower of Babel.

Another claimant for telephonic distinction appears in the person of M. Bursual, a French electrician, who says that he applied the principle 20 years before either Edison or Bell. It may finally develop that the telephone was in use at the building of the Tower of Babel. It is on record that there occurred at that time a surprising confusion of tongues, and this element is exceedingly well defined in the modern instrument.—*St. Paul Pioneer Press.*

Electricity for Fine Printing.

It is well known to printers that the highest class work in engraving and printing requires a power which is at once steady, reliable and under prompt control. The presses must run with perfect regularity and at constant speed, and to supply these conditions, electric motive power stands unrivalled.

In this issue we illustrate the press rooms of the Boston Bank Note and Lithograph Company, in which all the power used is supplied by a 10 horse-power Sprague electric motor. This is belted directly to the line of shafting running the length of the room, from which are run the presses, folders, cutters and other machinery used. Only a part of the presses used is shown in the view, the shafting extending a considerable distance beyond the limits of the engraving.

It is interesting to note in this installation the relatively small size of the electric motor, compared with the amount of machinery kept in motion. A steam engine of this size would require from 10 to 15 times as much space, without counting the room required for boiler, etc. The motor occupies a space of less than 18 cubic feet.

There are now about 20 Sprague motors used in the city of Boston for operating presses alone, while the total number is in the neighborhood of 200.

KINDRED INTERESTS

The "C. & C." Electric Motor Company have issued a very artistic pamphlet showing the application of their motors to blowing church organs. This company has made a specialty of this branch of electric power, and their installations have brought forth very strong and complimentary testimonials.

The Page Belting Company, of Concord, N. H., manufacturers of leather belting, both staple grades and specialties, have recently received orders from the following, among many parties from whom orders have come for their Acme link belt: Alexander Brothers, Philadelphia, Pa.; Gardener, Cook & Son, Laconia, N. H.; Dansville Electric (Limited) Company, Dansville, N. Y.; Orrs & Co., Troy, N. Y. (the second order); orders for three belts from Richmond, Va.; an 18-inch main driving belt for the Empire Mills Company, 16 Beaver street, New York; R. Dudgeon, New York; R. Hoe, New York; and an order from the Lackawanna Iron and Coal Company, Scranton, Pa., for a large belt (second order).

Reduced Rates for Fourth of July, over the Pennsylvania Railroad.

In pursuance of its liberal policy, the Pennsylvania Railroad this year will sell excursion tickets for the Fourth of July holidays, between all stations on its lines, at reduced rates. The tickets will be sold on July 3d and 4th, valid for return until July 7th, 1890. This reduction in rates does not apply to tickets sold between New York and Philadelphia. By the use of these tickets one can make a very pleasant trip at small cost.

Appreciated by the Daily Press.

To get some idea of the enormous increase of the uses of electricity and electrical power, it is stated that in the State of Texas alone, 236 new electric light companies were started in 1889; in the past four years the number aggregates 475. With such an enormous business in hand, and the certainty that the dynamo has come to stay, and that this now well tested power will reach widely into every field of industry, including its application to mining iron, coal and copper, it is a matter of surprise that the great financial interests of the world have not sooner grasped the opportunity of sure and safe capitalization of this new industry. The enterprise of Messrs. Lee, Higginson & Co., in formulating and carrying through the plan of a debenture bond company in connection with the Thomson-Houston interest, is worthy of warm commendation.—*Boston Daily Herald.*

A MAN who is a thorough electrician, understands the business and is willing to work, can hear of a good situation by addressing

R. A. E.,
THIS OFFICE.

TREASURY DEPARTMENT,
WASHINGTON, D. C., June 20, 1890.

SEALED proposals will be received at this department until two (2) o'clock, P. M., Monday, July 7, 1890, for wiring the U. S. Court House and Post Office, Brooklyn, N. Y., for a system of Electric Lighting. All particulars necessary in the premises can be obtained upon application to the Superintendent of Construction, at the building. The right to reject any and all bids, and to waive defects, is reserved. Proposals should be addressed to the Secretary of the Treasury and endorsed "Proposals for Wiring Court House and Post Office, Brooklyn, N. Y." Acceptance of proposal dependent upon appropriation by Congress.

GEORGE S. BATCHELLER,
Acting Secretary.

PATENTS.

ELECTRICAL REVIEW
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Conducts a general business in the preparation and prosecution of Applications for Patents, in the United States and all Foreign Countries. All business carefully and promptly attended to in the matter of Reissues, Caveats, Trade Marks, Labels, Design Patents, Copyrights.

SPECIAL SEARCHES made to determine the question of novelty or infringement. REPORTS MADE UPON THE VALIDITY OF PATENTS. These reports are based upon a careful investigation of the prior states of the art, and should always be authorized before investing capital in a business enterprize depending on patents; or in defending or attacking the validity of a patent.

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The Electrical Testing Bureau of the Johns Hopkins University will be closed until October 1st, 1890.

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In the City of Boston alone over 2,000 are used in Fire Alarm and Police Signal Service.

Supt. Flanders writes as follows:

OFFICE OF SUPERINTENDENT OF FIRE ALARM TELEGRAPH,
CITY HALL, Boston, Feb. 6, 1890.

GENTLEMEN: In answer to your inquiry in regard to the merits of the Gethins Battery as applied to this service, I have to say that after three years of the most exacting work it has clearly demonstrated itself to be greatly superior to any closed circuit battery I have heretofore used. Given the proper attention it runs three times as long as the gravity, maintaining an even current, is more easily handled and much more economical in expenditure of material. I get from 10 months to a year of continuous service from them without rebuilding, which, as stated above, is at least three times as much as was given by the Gravity.

Respectfully yours, B. S. FLANDERS, Supt.
By C. A. GEORGE, Asst.

Send for CIRCULAR and PRICE LIST to the Manufacturers,

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Coming to Washington to further any electrical patents, will profit by calling on **C. W. Messner, of 1225 F St., N. W.** All the appliances necessary for tests, experiments, etc. Also, Electrical Contractor and Constructor. Special attention to isolated plants. Agent for the "C. & C." electric motor—sizes, ⅛ to 50 horse-power. The only electric motor on the market to-day.

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ELECTRICAL PATENTS

INDEX OF INVENTIONS FOR WHICH LETTERS PATENTS OF THE UNITED STATES WERE ISSUED ON JUNE 17, 1890.

430,109 Conduit for cable railways; Andrew Bupon, Jr., New York, and John H. Pendleton, Brooklyn, N. Y., assignors to the Rapid Transit Cable Company, of New York.
430,128 Telephone; John H. Irwin, Morton, Pa.
430,147 Electric car; Louis Pfingst, Boston, Mass.
430,175 Combined fire alarm telegraph and gas lighting device; Chas. H. Crockett and Chancellor C. Allen, Boston, Mass.
430,208 Electric railway; Rudolph M. Hunter, Philadelphia, Pa., assignor by mesne assignments to the Thomson-Houston Electric Company, Boston, Mass.
430,252 Electric switch; John A. Norton, Bridgeport, Conn., assignor to John M. Orford, same place.
430,260 Arc lamp; Alfred U. Alcock and Henri Galopin, Melbourne, Victoria.
430,263 Signal for electric railways; Edward M. Bentley, Washington, D. C.
430,276 430,278 Phonograph. 430,277 Automatic determining device for phonograph. 430,279 Voltaic battery. 430,280 Magnetic separator; Thos. A. Edison, Llewellyn Park, N. J.
430,296 Insulator; Samuel Oakman, Melrose, Mass.
430,297 Underground electric cable; William R. Patterson, Chicago, Ill., assignor to the Western Electric Company, same place.
430,298 Spark arrester; Chas. Potticany, St. Thomas, Ontario, Canada.
430,310 Double acting explosive engine. 430,311 Cut-off for compound engines. 430,312 Single acting explosive engine; John W. Eisenhuth, San Francisco, Cal., assignor by direct and mesne assignments to the Electric Vapor Engine Company, same place.
430,320 Method of synchronizing alternate current machines; Edwin W. Rice, Jr., Lynn, Mass.
430,326 Electro-magnetic cut-out for electric lamps; Elihu Thomson and Edwin W. Rice, Jr., Lynn, Mass.
430,327 Regulator for dynamo electric machine.
430,328 Alternating current motor; Elihu Thomson, Lynn, Mass.
430,329 Electric railway; Merle J. Wightman, Hartford, Conn.
430,357 Electric arc lamp; Elihu Thomson, Lynn, Mass., assignor to the Thomson-Houston Electric Company, of Connecticut.
430,432 Electric meter; Joseph Oultin and Joseph Edmonson, Bradford, County of York, England.
430,437 430,485 Incandescent lamp; Frederick C. Rockwell, Hartford, Conn.
430,453 Process of melting or reducing metals by electricity; Thos. L. Wilson, Brooklyn, N. Y.
430,462 Electric incrustation preventer; William Bull, Quincy, Ill.
430,487 Electric crane; Alton J. Shaw, Milwaukee, Wis.
430,515 Electric railway; Daniel B. Devere, U. S. Army.
430,551 Electric meter; Geo. H. Wade, Atlanta, Ga., assignor of one-half to William B. Palmer, same place.
430,569 Coin controlled telephone guard; Samuel M. Dowst and Frank H. Hosmer, Chicago, assignors by direct and mesne assignments to said Samuel M. Dowst and Chas. O. Dowst, Evanston, Ill.
430,580 Electric railway; Rudolph M. Hunter, Philadelphia, Pa., assignor to the Thomson-Houston Electric Company, of Connecticut.

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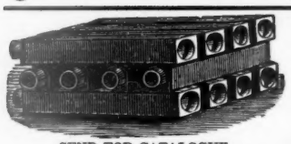

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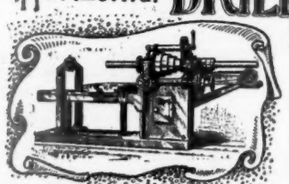

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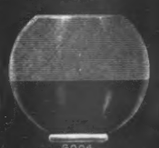
GLOBES  **SHADES**

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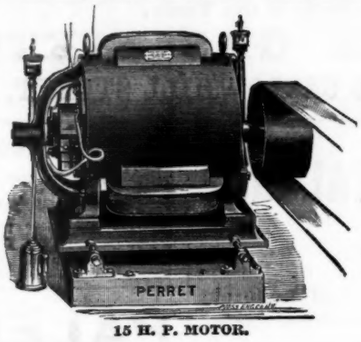

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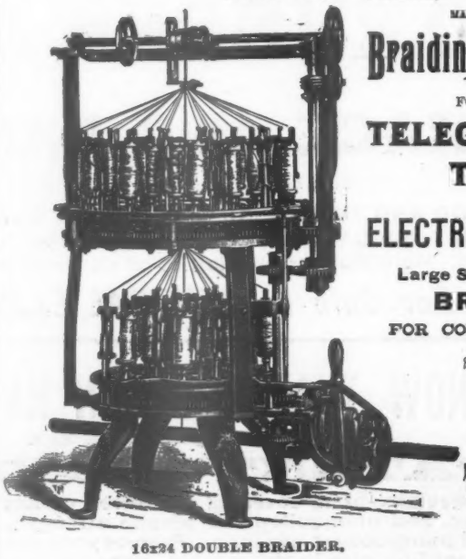

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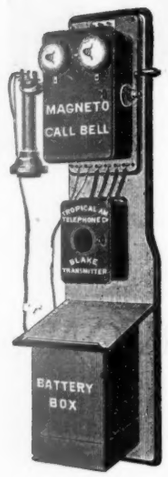

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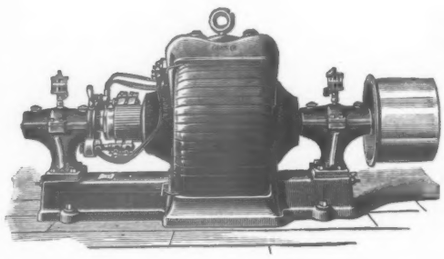

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C	8				6.5	1¼	5,000 FEET PER MINUTE.	530
D		10			6.8	1½		530
E				25	8.0	2		530
F	16				12.0	2¼		780
G		20			12.5	2½		780
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C		35			21.0	4	5,000 FEET PER MINUTE.	1,360
D			45		21.0	4		1,360
E				70	21.0	4½		1,360
F	40				29.7	6		1,750
G		50			30.0	6		1,750
H			64		29.5	6		1,750
I	52				38.0	8		2,290
J		65			38.6	8		2,290
K	64		83		38.0	8		2,290
L		80			46.5	10		2,770
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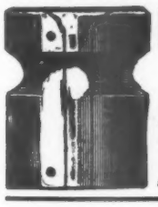

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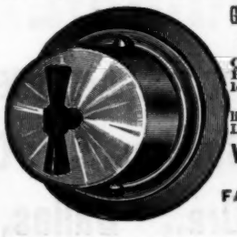

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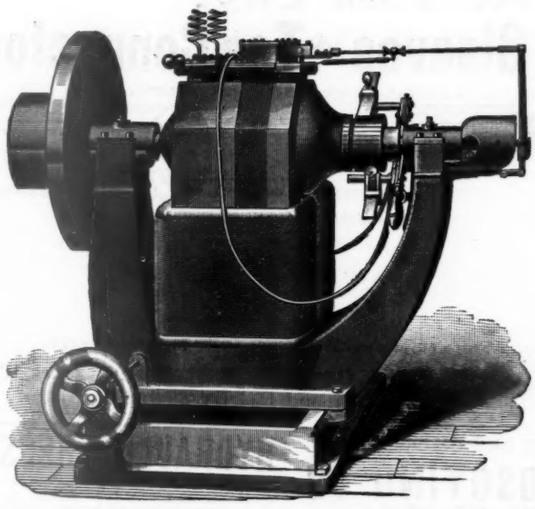

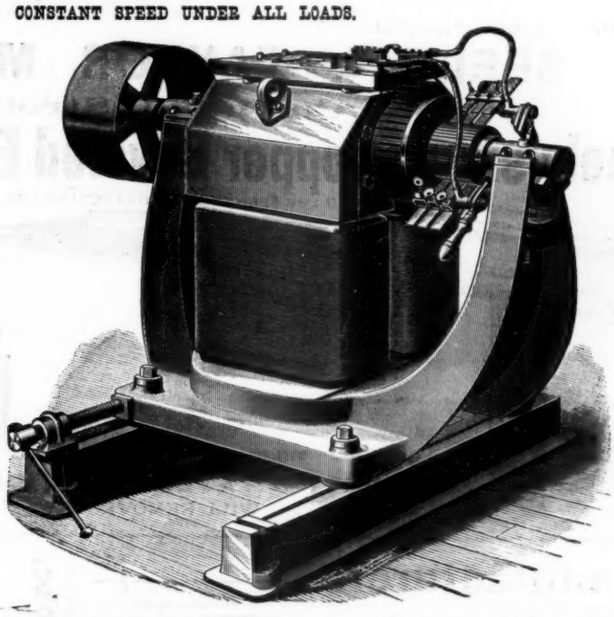

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FIG. 1.

Fig. 1 represents Copper Tee used for branching from main cables, as shown in Fig. 2.

FIG. 2.

Fig. 3 represents a Copper Sleeve used for straight connections for continuation of cables.

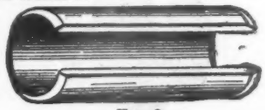

FIG. 3.

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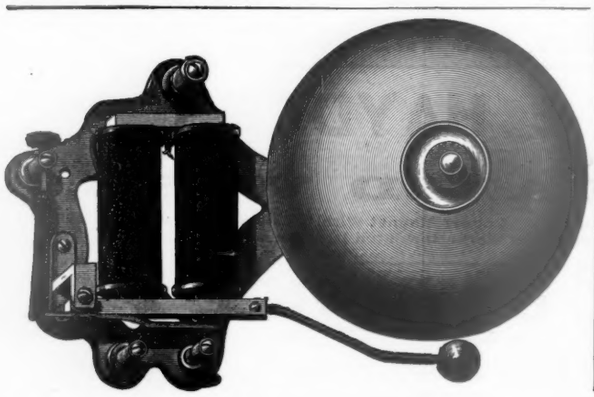

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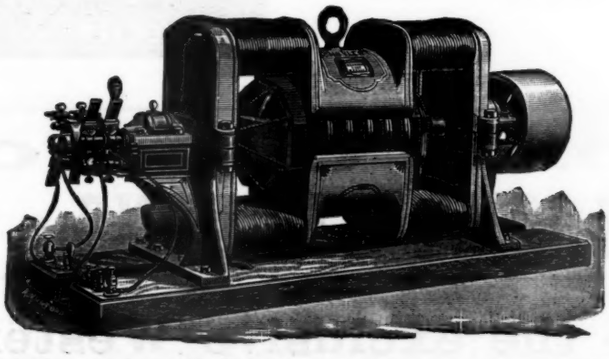

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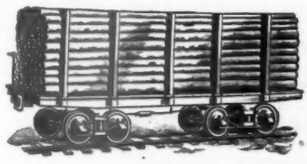

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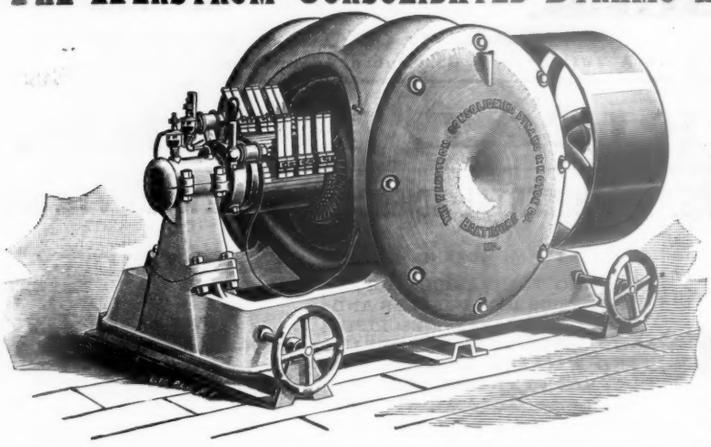

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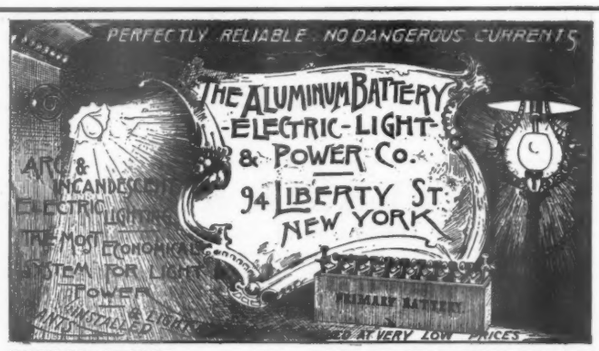

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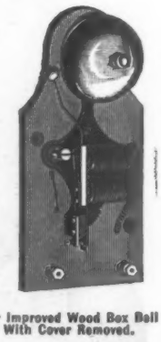

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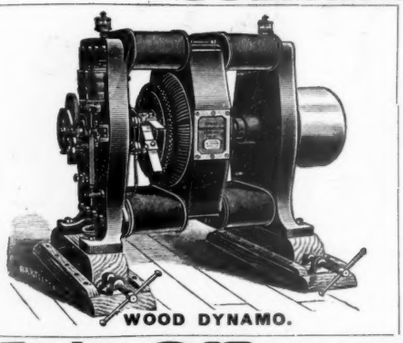

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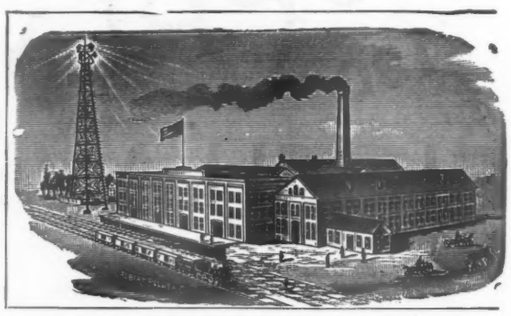

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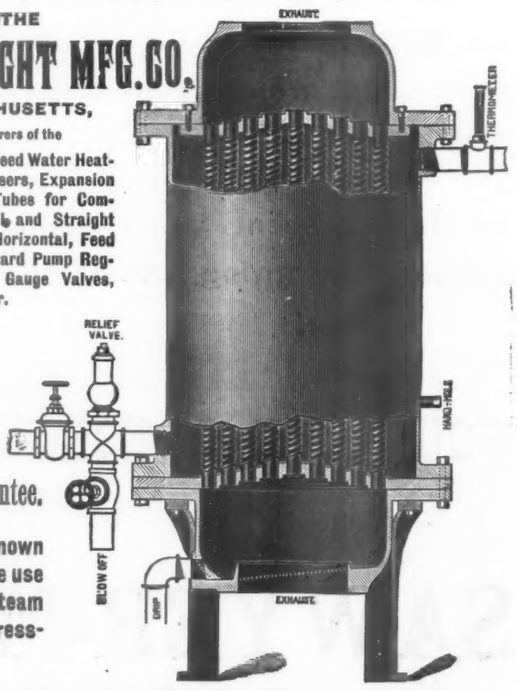

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